Independent guide to the BBC MICRO!

THE MICRO USER

Volume 3
Number 4
June 1985
£1.25

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Board game strategy on your micro

Build your own wind station

Three vital print routines
Rescue Fido from the well
Create machine code sprites
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– Page 95

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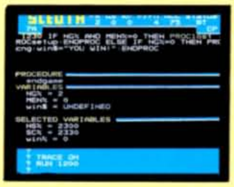

```
1230 IF NG% AND MEN%=0 THEN PROCISET
ROCsetup:ENDPROC ELSE IF NG%=0 THEN PRC
cng:win$="YOU WIN!":ENDPROC

PROCEDURE
  endgame
VARIABLES
  NG% = 2
  MEN% = 6
  win$ = UNDEFINED

SELECTED VARIABLES
  HS% = 2300
  SC% = 2330
  win% = 0

  TRACE ON
  RUN 1200
```

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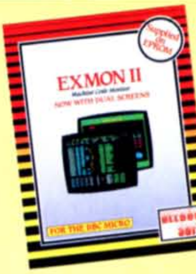
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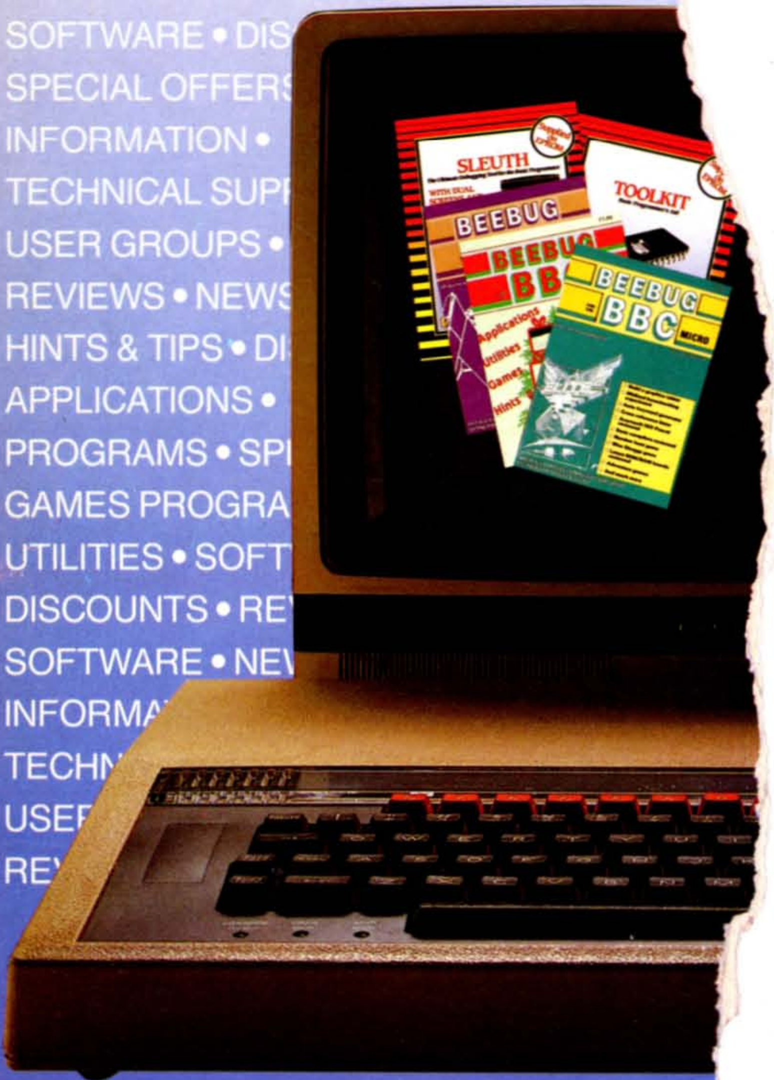
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ABC 68,328
January-June 1984

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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Typesetting, outputting strings and a pound/hash ROM fix for the Epson.

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Hours of fun with this delightful version of Simon written especially for the light pen.

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Link the pictures with the words: a game that will provide hours of fun for all.

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Teach your micro to recognise simple objects with this powerful program.

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Ding dong bell Fido's in the well. Can you entice her out by collecting all the mice?

169 **MICROMAIL**
This is the part you write yourself – your news, views, ideas, praise and moans.

183 **ORDER FORM**
Back issues to binders, cassettes to cases, discs to dust covers – they're all here.

In last month's issue of

THE MICRO USER

We gave the first announcement of the creation, with the help of

TELECOM GOLD

of a new national database for micro users . . .

MicroLink

This month we can give full details of the scheme, including the facilities on offer and the costs, together with your application form.

– See Page 95.

NEW
16k EPROM

***HEX,** Is a full HEX dump, displaying 8 bytes of HEX and ASCII equivalent per line. A status line shows the current address and the byte at this address in:- HEX, ASCII, Decimal and either the binary, basic token or assembler mnemonic. Forward and reverse scrolling of the display at normal and high speeds is a feature, as is a full on screen memory editing facility which allows inputs in either hexadecimal, ASCII characters or assembler mnemonics.

***MON,** Serves the same function as *HEX, but the display is in disassembled opcodes, rather than *HEX. The editing and scrolling facilties are the same as for *HEX. An additional feature of *MON is the ability to directly follow JSR's, branch's etc.

***DEBUG,** A full featured program debugging aid, allowing the programmer to see the most intimate details of the program under examination. Features, variable speed, single stepping, breakpoints, continuously updated disassembler, selective HEX dumps (up to 6) plus current stack, all continuously displayed on screen, plus many other features.

***DISCED,** A comprehensive disc sector editor enabling any sector of a disc to be read, inspected, edited and written back. It will work with any 40, 80 or dual formatted single density disc.

***DGET,** Searches a disc for all occurances of a string or group of bytes.

***REL,** Enables machine code to be easily moved around in memory, automatically adjusting JSR's, JMP's etc.

***SLOW,** This command causes the entire computer to slow down to any variable speed between 1 and 255. This can allow the in depth study of graphic's methods etc.

***EDIT,** A dynamic basic screen editor, cursor controlled with full forward/reverse scrolling of listing, incorporating insert/delete lines, insert/overwrite characters, enter line from any position after editing.

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"The Slave Drivers Guide."

***REF,** Produces a cross-reference listing of the current basic program. All variable names are listed (WITHOUT HAVING TO RUN THE PROGRAM!) in alphabetical order followed by the line numbers on which they are referenced. Numeric items can also be crossed referenced if desired.

***SORT,** A built in sort routine allowing any single dimension array, be it integer, real or string, to be sorted.

BASIC COMMAND LIST:-
*PROG, *BAD, *EXTEND, *PACK, *SORT, *PAGE, *ENVELOPE, *FIND, *REPLACE, *XREF, *TRON, *TROFF, *CHAR, *EDIT, *EDKEY.

MACHINE CODE COMMAND LIST:-
*MCODE, *MOVE, *CROM, *SLOW, *GET, *PHEX, *GO, *MON, *HEX, *SPACE, *DGET, *DISCED, *DIS, *DEBUG, *CRC, *REL.

Designed with the serious programmer in mind, a 16K Eprom packed with a multitude of programmer friendly utilities, as with all SLAVE'S, SLAVE is instantly available and will obey an extensive range of commands. So why not invest in more muscle for your BEEB, and get some help with the heavy work!!! SLAVE has over 30 comprehensive machine code and basic tools.

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Your BBC would not be without it

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SOLIDISK's SIDEWAYS RAM is an almost indispensible add-on for the BBC user.
It is available in either 32k, 64k or 128k byte capacity and is compatible with all issues of BBC microcomputers along with most of the add-ons and ROMs obtainable for it.
To date, more than 37,000 units have been sold.
The Sideways RAM occupies the right most ROM socket of the BBC and sits in the same position in the micro's memory map as the paged ROMs.
This means that the Sideways RAM can run almost all ROM type software including languages, utilities and filing systems.
The difference between Sideways RAM and Sideways ROM is that RAM can be written to meaning that only the presently required software has to be loaded into the machine, thus making redundant the multitude of high current consumption and often unsightly ROM extension boards.
Sideways RAM is also an invaluable tool for writing ROM type software to run on the BBC since software may be assembled straight into the area in which the final version will run. This will save a lot of time over using offset assembly and eprom programming/erasing on a non Sideways RAM equipped BBC.
For the user who is not interested in writing ROM type software but is in need of the utilities provided by the use of the Sideways RAM, we supply free software to make maximum use of the Sideways RAM facilities.
These are included in the Sideways RAM Software package, a collection of no less than 5 diskettes containing nearly 100 programs, from database, word processor, music system, sprite graphic, printer buffer, virtual memory, spelling checker, RAM disk, RAM filing system, VDU replay, disassembler, machine code monitor, macro basic, video digitised pictures etc. and Solidisk Most Advanced Disk Filing System version 2.0.
Another extremely useful feature is the ability to configure the Sideways RAM as a 'SILICON DISC' as in our STLDISC program. It makes use of available Sideways RAM as an extra disc drive.
Once the STLDISC program is loaded it acts exactly like a normal DFS with the exception that one drive is now allocated to the Sideways RAM. All operations on this drive are much faster than a physical disc drive and, of course, impart no mechanical wear to them. This means that programs may be repetitively loaded, saved, spooled or exec'd many times and only the final version need actually be saved to disc.
The extensive use of the facilities offered in the STLDISC program will allow the physical disc drives to go longer between services and the discs themselves to last longer and could in fact pay back for itself in a fairly short while.
The STLDISC program will operate on any size of Sideways RAM and will configure itself to the available space. Therefore a 16k board will give 4k bytes of storage, whereas the 32k will give 20k bytes and the 128k up to 116k bytes of 'Silicon disc' storage space.

PRICES

The listed price (effective from the 15 April onwards) comprises the Sideways RAM fully guaranteed for 1 year, comprehensive manual and a software package consisting of 5 diskettes formatted either in 40 or 80 track. Please specify when ordering.

- SWR32 (32k unit, by far the most popular): £58.95
- SWR64 (64k unit, new introduction model): £85.00
- SWR128 (128k unit, the second most popular): £149.00

As Solidisk Software Support Service has to produce in excess of 16,000 diskettes every month, we regret that we can no longer provide personalised service for disk copying. In extreme cases, when you need to update your software diskette, either reorder a new software package (which is always sold to you at nominal media cost (plus post and packing) or return the old package with £2.00 to cover post and packing. You may avoid post and packing costs if you call at Solidisk's stand at any BBC micro exhibition or at the Solidisk office.

UPGRADING

Upgrading from a smaller model is very simple: you return the old RAM board to us with your payment.
The listed prices include the full software package and new manual.

THE SOFTWARE PACKAGE

The Software package comprises of 5 diskettes, formatted either in 40 or 80 track. Please specify when ordering.

Volume 1:
Volume 1 contains all the general applications of Sideways RAM such as load and save ROMs (the Menu program), printer buffer (the Printer program), Improved Disk Filing System with unlimited catalog or PAGE at &E00 (STL0E00 and 2.0 ROM), Silicon Disc (the STLDISC program), the Quickcopy and the Fast Backup programs which use Sideways RAM to save you time and disk swapping effort.

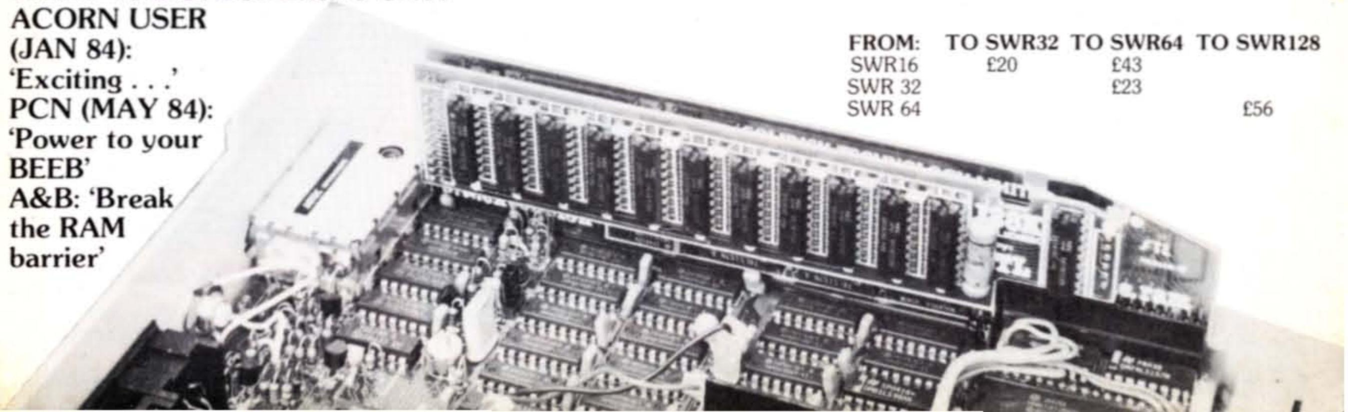
Volume 2:
Volume 2 contains the Wordprocessor, Spelling Checker and the English Dictionary.

Volume 3:
Volume 3 contains the Macro Basic (a program generator), a Linker-Editor and the Virtual Memory Program, which lets you use Sideways RAM to store Basic programs thus allowing otherwise too large programs to run.

Volume 4:
Volume 4 contains a suite of programs, all part of the Solidisk Database system. This Database allows you to retrieve any record of up to 6500 records quicker than you can remove your finger; each record can have up to 15 fields of up to 60 characters long. 15 utilities are included allowing printing of forms, tabulation, mailmerge, maths etc.

Volume 5:
Volume 5 contains extensive programming aids such as the powerful Solimon, the 65C02 assembler, the Solitrace, a dual screen tracing utility, the Invisible trace, the Sprite and Sprite generator capable of moving 32 sprites anywhere in a single picture frame, the VDU Recorder, which mimics a £10,000 graphic computer and more.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).



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The 1.9 ROM offers both single and double density formats, with built in disc formatter and verifying, along with such features as automatic density sensing and 40/80 track software controlled switching. The speed is now programmable by the keyboard links to suit almost any type of disc drive and the maximum file size is now only limited by the capacity of the disc.

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The date transfer rate of the 8″ look alike is double that of a standard 5.25″ double density formatted disc or an amazing four times that of a single density formatted disc. This gives a data transfer at the incredible speed of 500kbits or 64 k bytes a second.

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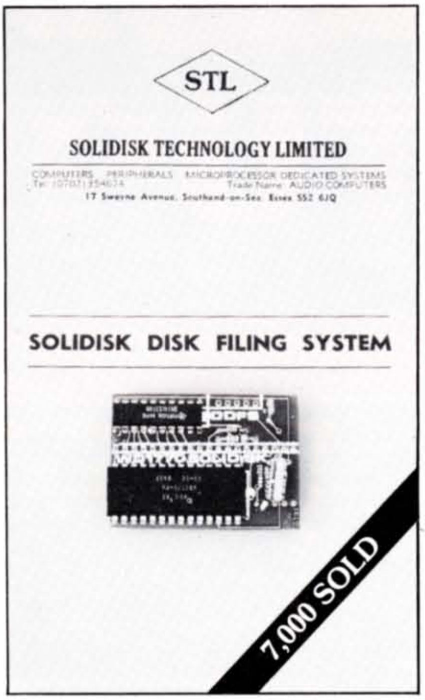

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Once the machine is up and running it is then simplicity itself to change FDCs; just throw the switch attached to the DFDC board, press BREAK and the other FDC is now selected.

This allows the user to get the best facilities available from both the 1770 and 8271 floppy disc controller chips with the minimum of fuss.

The DFDC board may also be used as a Stand Alone DFS if your BBC is not yet upgraded for disc systems. All the necessary chips and instructions are supplied and the 8271 may be added as an optional extra at a later date.

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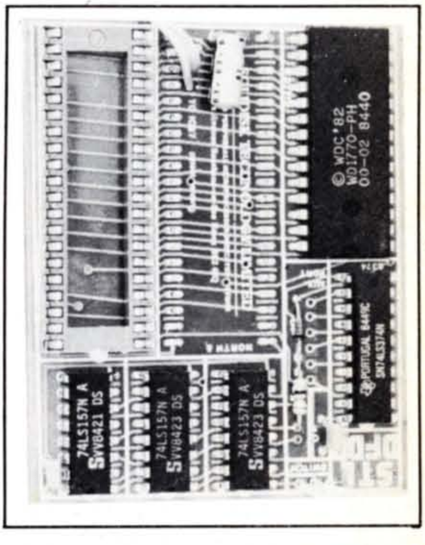
The DDFS consists of only 4 components to be plugged in to the BBC Microcomputer and can be fitted in just a few minutes by novice and expert alike.

Whilst many other manufacturers rely heavily on distribution outlets to do the selling for them, SOLIDISK relies on a good product and a large support network to win the heart of the user. With over 60 local experts, covering England, Scotland and Wales, a SOLIDISK National User Group in Holland and soon in Australia, SOLIDISK can offer many users regional free fitting and advice. Also with an ever increasing catalogue of free software, available to all SOLIDISK users, comprising of Programming tools, Graphic windows, Musical tunes, Spelling checker, Computer Aided Design, Disc utilities etc., even users who are new to the DDFS can expect to build up a large disc program library in a fairly short time.

Solidisk Software Support Service now has a responsibility to over 35,000 users and the ability to give you the best possible support matched only by the largest companies.



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SOLIDISK DFS ROM 2.0 IS OUT:

The Solidisk Advanced Disk Filing System for the BBC computer is now available for both Solidisk DDFS users and Acorn DFS users as an upgrade for the DNFS 1.2ROM.

Standard features include:

1) Unlimited Catalogue entries (up to disc capacity) without any special preparation.
With Computer Concepts's Disc Doctor or Watford's DFS, you have to specify BEFORE formatting if you want 62 filenames. Once formatted, you can no longer modify the format.
With ROM 2.0, there is no limit to the number of files and programs you can have on the same diskette. Until it is completely full.

2) Unlimited filesize.
This feature is sometimes a very good sales argument for databases.

3) Automatic Write Error Correction.
Every disk write operation is immediately followed by a read operation to ensure that the recorded data is free of all errors. Then if needs be, ROM 2.0 will restart the write operation from the unsafe sector.

4) Automatic 40/80 track stepping.
No other DFS allows you to directly backup a 40 track disk to an 80 track disk, even if you have a switchable disk drive, since the hardware cannot replace the software! ROM 2.0 allows you to backup and copy any 40 track disk to 80 track, single to double density (if available) even on the same drive without any special care.

5) DISC REPAIR FACILITIES.
Disc sector editor (*DZAP), memory editor (*MZAP), recover good sectors (*RECOVER), re-write multiple sectors (*RESTORE), Read disk format (*R40 and *R80), recover bad sectors and bad track (*RTRACK), repair and restore bad sectors and track (*WTRACK) and the powerful disc copy (*DCOPY) which is capable of duplicating even some non BBC disks in under 1 minute in both single and double density (if available).

6) Tape to disc facilities.
This facility allows automatic transfer of all programs and most games to disk (*TAPEDISC and *LOADTAPE). Only in some cases (multi-part game cassettes), will you need Clare's utilities.

7) Wordprocessing facilities.
This facility allows !BOOT and other text files to be edited, saved and printed. Any screen mode and text up to 24k can be handled.

8) PRICE
The 2.0 ROM costs £20.00 to all Acorn DFS users. Included in the price are the Advanced DFS User Manual and VAT.
As an upgrade for the 8k Solidisk DDFS 1.9, the price is only £10.00 inclusive. Please note that you do not have to send back your present DDFS ROM when ordering, but post it later in the return envelope sent together with the 2.0 ROM, quoting your credit card number as a guarantee.

SOLIDISK KEYBOARD AND CPU ARE NOT JUST PRETTY . . .

The keyboard is 12 mm lower than the normal BBC case, 2-3 degrees more angled, weighs only 5lbs, does not skid about on the desk while enjoying 2 feet of freedom from the computer unit — and makes a lot of difference to the typist (even 2 fingered ones!).

The CPU accommodates 2 disk drives and withstands any heavy weight monitor while providing easy attachment for the whole system, CPU and disk drives, to the desk if need be. There is good ventilation to the power supply too and all untidy cables are hidden away.

PRICE

The complete CPU and keyboard case costs £30.00 inclusive + £3.00 post and packing. The system could be yours free as part of the Mitsubishi twin discs offer. Actually the best thing that happened to the BBC computer for a long time!

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- — All leads and manuals (2).
- — One Software package comprising 5 program diskettes as detailed below.
- — Full one year guarantee.
- — All for £209.95 inclusive of VAT and carriage.

IMPORTANT

If you upgrade (now or later) to twin Mitsubishi M4853 disk system, Solidisk will offer you, subject to stock availability, absolutely free a CPU and keyboard case as shown earlier.

For that, you have the choice of ordering a 640k Mitsubishi disk outfit now and then later on, of returning your disk drive, enclosing payment of £160 to cover the second disk drive and carriage. Alternatively, save by ordering right now a complete twin Mitsubishi (2MB unformatted, 1.3 MB formatted) Fantastic Offer at only £359.95 inclusive.

DataLife
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THE HARDWARE:

As described earlier as shown opposite.

THE SOFTWARE:

The software comprises 5 diskettes, formatted in 80 tracks. Volume 1 contains the Word Processor, Volume 2 the Database, Volume 3 the new Spreadsheet 1.1, Volume 4 the disc, tape utilities and a blank dictionary.

It would take several pages to describe them all. In general, they are of the highest standard as our hardware products. Only the first 2 volumes will be described below.

Volume 1:

Solidisk Word Processor and Spelling Checker with English dictionary. Easier than View, Wordwise or Scribe, you enter the WP by *WP (filename), then start typing. What you see on the screen will be exactly printed on paper.

You don't even need to read the manual twice, the most useful commands are all displayed on the top part of the screen.

This Word Processor features 80 column screen throughout, direct on screen justification, automatic margins, page numbering, printer special commands, Wordstar like editing commands for block move, block delete, block copy, print, save, load text to cursor, insert and overwrite, search and replace, total word count, word frequency count, free space, * commands etc, etc.

Solidisk WP loads and saves texts under 1 second flat and also you may save the edited version as many times and under any filename you like.

And also better than any other wordprocessor, you can spell check your document without leaving it, simply type in Control-U.

It has self dictionary generating capability too. You may create any dictionary you like simply by entering the words.

Solidisk WP is also excellent as a training tutor for Wordstar, as used on most 16 bit computers.

Volume 2:

Solidisk Database. Solidisk Database is a random access system, completely menu driven and more importantly, very easily customised to suit any particular need.

Important features include unlimited filesize and number of records, all maths functions and 80 column screen throughout. Solidisk Database is particularly simple to understand and easy to use. You are first presented with an option menu, which comprises 15 different options. Each option will then lead to a new menu and so on. Mostly you only have to enter an appropriate data or hit the RETURN key.

You can design a new database, list all records, edit them, merge them, split them, making mailshot with Solidisk WP etc. For instance, Solidisk telephone enquiries are dealt with by an ordinary BBC with twin Mitsubishi holding the last 4000 sales records. Typing in the name you retrieve the complete record quicker than you can remove your finger. It of course runs Solidisk Datafile.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

NEW PRODUCT ANNOUNCEMENTS

Solidisk MODEM.
Single chip FSK, Multistandard internal MODEM, requires no soldering, no adjustment.
Supplied with Menu Driven SoliComms 16k ROM, ready to be connected to any information provider such as Prestel or Gold.
Auto dialling, auto answer, auto baud rate, auto error correction.
Available soon. Price: £39.95 inclusive.

Solidisk Third Processor
Internally fitted 6502 compatible with Acorn Second Processor, 128k as standard, upgradable to 256k, 4 Sideways ROM sockets, software supplied in ROM allowing unused RAM to be loaded with Sideways Software or used as Silicon Disk. Available soon.
128k 6502 TP: £179.00 inclusive.
256k 6502 TP: £229.00 inclusive.

IN STOCK:

1) NEW LOW PRICE EPROMS.
2764s and 27128s are going down in price.
5 x 2764s now cost you only 24.95 per pack.
3 x 27128 now only 25.95 per pack.

2) PLENTY OF UVIPROMS AND UVIPACS.

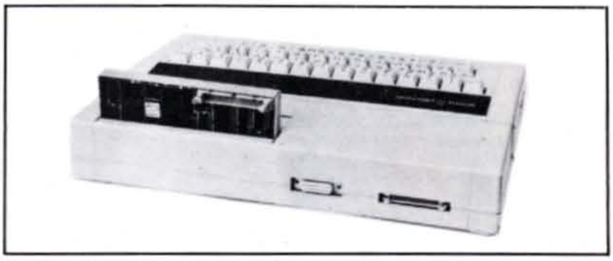
3) ELECTRON DISK INTERFACE.
This interface is BBC compatible and includes 3 Sideways ROM sockets.
It Plugs into the PLUS-1 and allows direct attachment of disk drive and software compatibility with BBC disks.

PRICE: £39.95 inclusive, P&P: £1.00.

SOLIDISK LOCAL EXPERTS

We have people able to fit your equipment free of charge in all the following towns. If your area is not mentioned, ring the office!

Dunstable, Leighton Buzzard, Reading, Peterborough, Wimslow, Penzance, Torquay, Wimborne, Basildon, Stroud, Southampton, Hoddesdon, Watford, Bexley, Margate, Rochdale, Boston, London (all areas), Oldham, Hunts Cross, East Dereham, Rushden, West Bridgford, Wantage, Bambury, Grimsby, Kingston, New malden, Woking, Taunton, King Norton, Sutton Coldfield, Halesowen, Leamington Spa, Hassocks, Salisbury, Swallowne, Leeds, Huddersfield, Treowen Newtown, Newtownards, Co Fermanagh, Co Londonderry, Le Mesnil St Denis (France), Kalgoolie (Australia), Paramatta (New Sth Wales), Manawatu (New Zealand).



Short form price list. Full price list on request.

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Sideways RAMs:		
SWR32	£58.95	£1.00
SWR64	£85.00	£1.00
SWR128	£149.95	£1.00
CPU & Keyboard Case (both)	£30.00	£3.00
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DDFS (with 1.9 ROM)	£38.95	£1.00
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2764 x 5 new low price	£24.95	£1.00
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MD557 2S/4D	£28.00	£1.00
65C02 with Software	£13.00	£1.00
Solimon-2 16k ROM	£13.00	£1.00
2.0 DFS 16k ROM	£20.00	£1.00
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CLARES Nº1 IN UTILITY SOFTWARE!

Enhanced BETA-BASE £25

WHAT IS A DATABASE?
It is a FILE containing RECORDS, each record consists of a number of FIELDS containing the information—an analogy can be drawn with a card index in which a box of cards is the file, each card is a record and each line on the card is a field.

SPECIFICATION

1) Random Access	— disc based, single or dual drives.
2) File Sizes	— max 65,000 records.
3) Record Size	— up to a 2048 characters and 200 fields.
4) Field Size	— up to 254 characters.
5) Holds	— approx 1200 ADDRESS records per 100k.
6) Search	— 5 search fields using powerful options.
7) Sort	— 500 records on 3 fields in 60 seconds.

SYSTEM FEATURES

- ★ CALCULATE—using any valid expression and store results.
- ★ POWERFUL PRINTOUT OPTION—eliminates need for separate mailing program, parallel/Serial Printout allows setting of printer control codes, line spacing, tabulation, Headings etc., plus label printing with horizontal and vertical tab control.
- ★ REDEFINE—Titles, field widths, number of fields, number of records etc.
- ★ TRANSFER—Records from one file to another.
- ★ SEARCH LISTS—Allow creation of sub Databases within main Database.
- ★ GLOBAL ENTRY—provides easy entry of repetitive data and a powerful global edit/update facility that will save hours of typing.
- ★ SPOOLER—enables you to create spooled files that are compatible with Wordwise, View and other word processors. The spooler program will allow you to format your spooled file in the same way as the powerful printout option. You can therefore have headings, columns, titles, numbers etc.
- ★ INPUT—is a routine included on the disc which will allow you to write your own utilities for accessing your data. Many of the programs on the coming utilities disc were written using this procedure.
- ★ TUBE—compatible with the 6502 second processor.
- ★ Comprehensive manual and tutorial.

Coming soon, (Honest!)

Beta-Base Utilities disc containing many advanced features such as full disc sort, AND/OR search on 10 fields, wildcards, mail merge + many other features.

If you would like information as soon as it is ready please send a SAE and we will advise release date and price (about £12).

"Beta-Base is a joy to use"
BEEBUG March 85

"Excellent value for money"
A & B Computing OCT 84

"rated best value for money"
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clares
MICRO SUPPLIES

REPLICA II £12.00

In addition to working with the standard single density DFS's REPLICA II is now compatible with the following double density DFS: OPUS 3.45, UDM v. 2.00 and CUMANA QFS.

The original REPLICA set a very high standard so the specification that we set our chief programmer presented him with a real challenge. In fact REPLICA II is now 2 separate programs, one for DFS using the 8271 controller and the other for the various DDFS that fully implement OSWORD &7F. REPLICA II will transfer many of your cassette based programs to disc, even more than REPLICA did. Now when you buy disc drives you do not have to throw away your expensive cassette based programs.

REPLICA II transfers 'LOCKED' programs, programs loading as files, programs that load below &E00, those with up to 9 sections and those up to &6E in length e.g. adventure programs. No more waiting for 6 minutes whilst your adventure programs load.

REPLICA II is very easy to use and the user just enters a name, how many sections and whether CHAIN, *RUN or *LOAD is used to load the first section. Press play and let the program do the rest, even a menu. Just think how much it will cost you to buy a disc version of your favourite program—it is probably more than REPLICA II, which will hold up to 16 programs, limited only by the disc capacity and catalogue.

STATE DFS & 40 or 80 tracks

New! PROFILE £12.00

A PROCEDURE LIBRARY MANAGEMENT SYSTEM

Now you can start the procedure library that you always promised yourself. PROFILE allows you to store, list, merge and grab procedures without any of the headaches. Automatic alteration of LINE NUMBERS and resident variables such as TOP, LOMEM etc release you from the tedious chore of setting and resetting, checking and rechecking. PROFILE leaves you free to create your programs without disturbing your chain of thoughts.

- ★ 100 Procedures can be stored on each disc (disc space allowing)
- ★ NO LIMIT to the number of procedure discs used
- ★ MERGE Procedures into your programs easily
- ★ LIST Procedures from disc to check suitability etc
- ★ RENAME Procedures on disc
- ★ GRAB new Procedures from existing programs
- ★ NESTED Procedures can also be grabbed automatically

A Procedure can be a FUNCTION, a BASIC program or part of it or a PROCEDURE.

With PROFILE you will quickly amass a wealth of procedures which will enable you to write programs quickly and easily. Simply write the controlling program containing the procedure calls and PROFILE will merge the procedures for you.

PROFILE in effect provides you with a MACRO BASIC in which you only have to define the procedure once and it can be re-used automatically thereafter.

Make life easier for yourself and order PROFILE today.

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Open 9—5pm Monday—Friday
LUNCH 12.30—1.30

New! BETA-ACCOUNTS INVOICE & DELIVERY NOTE MODULE £25.00

This is the first module in an integrated accounting suite of programs written to be used and not simply to please an accountant. This module contains an INVOICE and DELIVERY NOTE program with 80 column input and screen editing, you see what will be printed before committing yourself. Account customer details are inserted automatically and delivery notes generated automatically when required. Customer details without account numbers can be automatically placed in a Beta-Base compatible file for use as a mailing list.

A sales ledger sheet is printed automatically when there is enough data to fill a page, alternatively the user can print the ledger sheet before a full page to suit his needs. VAT details are generated at the end of the VAT period and the year to date figures can be viewed at any time. Provision is made for multiple VAT rates including standard, zero, export and exempt.

A transaction file is generated for account customers for use with the STATEMENTS and ACCOUNTS RECEIVABLE module.

Future modules will be STATEMENT and ACCOUNTS RECEIVABLE, STOCK CONTROL, ACCOUNTS PAYABLE and NOMINAL LEDGER. All relative files are compatible with CLARES Beta-Base which can be used to manipulate the files as required. A Beta-Base Utilities Disc will soon be available and will provide Mail-Merge facilities and links into ULTRACALC plus many other features.

- ★ INTEGRATED ACCOUNTS and DATABASE
- ★ MULTIPLE VAT rates
- ★ SCREEN EDITING with insert & overwrite
- ★ AUTOMATIC DELIVERY NOTES
- ★ INVOICE COMMENTS
- ★ ACCOUNT HOLDERS details inserted automatically
- ★ MAILING LIST generated automatically
- ★ LEDGER SHEET printed automatically
- ★ VAT sales returns prepared
- ★ TRANSACTION FILE generated
- ★ Beta-Base compatible

This program was written for our own use and is used to prepare hundreds of invoices per week. It has no unnecessary questions or keys to press and extensive but easy edit options, we have made life as easy as possible for ourselves so why not take advantage of our efforts.

Requires double sided single or twin single sided drives for minimum configuration -no stock control or customer database. Double sided twin drives will enable a full integrated system to be used.

FUN HOUSE £10.00

FUN HOUSE is a highly original suite of educational programs suitable for ages 3 to 13. The program is designed to encourage children to spell words which relate to objects found around the home. Animation and music are used to good effect and some highly original ideas are incorporated. Each room exercise is terminated with a warning item e.g. the lounge finishes with 'FIRE' which goes on to engulf the whole lounge. Tests with a newly hired 4 year old resulted in us having to prise him away from the keyboard after 2 hours. In that time he had gone from never having used a keyboard to finding the location of all the keys very quickly and entering the correct answer. He had thus started on the path to learning spelling and familiarised himself with the keyboard including the use of DELETE to correct his mistakes. Can you afford not to give your children the same start?

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NO EXTRAS! Please state 40 or 80 track disc and state which D.F.S. you use

BROM

21 EXTRA COMMANDS

THE NUMBER ONE

TOOLKIT ROM
FROM CLARES

BROM ▭ **£34.50** ○ **£27.50**

BROM is the first toolkit ROM to provide a FULL SCREEN EDITOR, which means that you can scroll your program up and down just like WORDWISE does with text, do not confuse this powerful editor with the line editor used in other toolkit ROMs. The EDITOR allows insertion and deletion of lines and insert and overwrite within a line. This is the editor that the BBC micro should have had.

Closely related to the EDITOR is the EXTENDED ERROR HANDLING which will trap errors in a program and enter the EDITOR at the line generating the error, not only that but it will also position the cursor as near to the statement causing the error as possible, no more wading through multi statement lines trying to identify the error.

Commands unique to BROM are:

ROMON & ROMOFF which enable you to turn on/off sideways ROMs so that they stay off even after CTRL/BREAK, very useful for avoiding clashes especially for users with second processors. This also works with the DFS and reverts to PAGE &E00 automatically.

CASE which forces input into upper or lower case irrespective of caps/shift lock.

FLIST which lists a program one statement to a line but more importantly it will even list 'BAD PROGRAMS.'

ONEKEY is a single key entry option but you can also define your own strings to any ASCII key, just like an extra 48 function keys.

Another group of commands provide FIND and selective or global SEARCH and REPLACE facilities. These commands work with strings and keywords or a mixture of both e.g. '*FIND PROChelp T', will list the full line containing PROChelp, the 'T' simply tokenizes any keywords.

Yet another group of commands allow lines to be moved or copied to a new location.

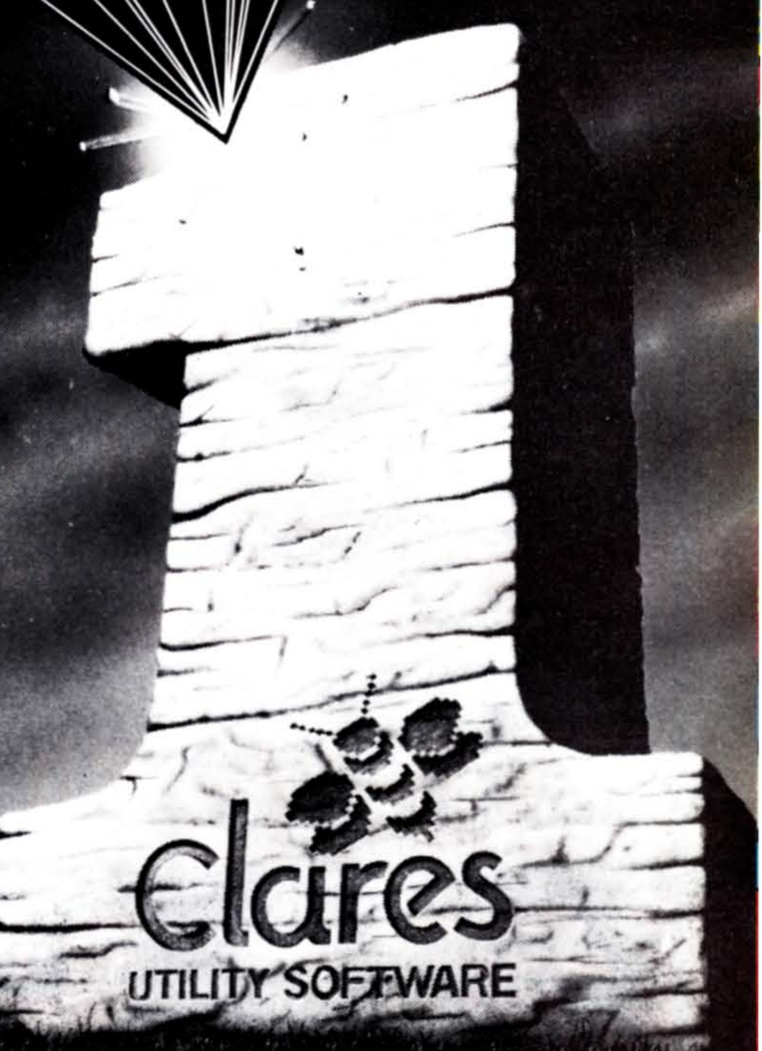
The other commands provide function key editor, 'BAD PROGRAM' cure, variable lister, integer variable flush, program compacter etc.

This is a genuinely useful ROM that no user should be without. Be warned, once used you will not be able to live without it!

"...this is the best On-Screen BASIC Editor I have ever used; it is far superior to ****** softs Toolkit."

Viewfax Tubelink & ACORN USER.

The Brom disc is suitable for use with SOLIDISK SIDEWAYS RAM.



○ — DISC
40 — 40 TRACK
80 — 80 TRACK
3 — 3" DISC—ADD £3
▭ — EPROM

UNLESS STATED ALL DISCS COMPATIBLE WITH ACORN, WATFORD 1.3, AMCOM, UDM 2.0, OPUS 3.45 AND CUMANA QFS. PLEASE RING FOR COMPATIBILITY WITH OTHER DFS.

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ADD VAT TO ALL PRICES EXCEPT BOOKS

Add £1.75 for programs on 40 or 80 Track Disc. No post charge in UK

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memo·calc

107 MEMO-CALC £12.95 B C/D
"IT MUST BE AMONG THE LEAST EXPENSIVE PIECES OF USEFUL SOFTWARE YOU WILL EVER BUY" Revue by Practical Computing July 1983.

Database/calcsheet program which allows up to 255 columns. The number of rows is automatically set from 5 to over 1000 depending on the columns declared. Both numeric and alphanumeric data can be stored in any cell and can be of any length up to 255 characters.

There are a multitude of uses for this program from accounts to diaries, club or personnel records etc. and is probably the one program that we all need. MODE7
107a Manual for MEMO-CALC included free otherwise £2.00 (0% VAT)

PAYROLL

Part 1 is a BASIC program running in MODE7 which accepts new data on employees, allows additions, deletions and alterations, listing of P35 & automatic alterations to the codes as required by tax notice P7X. Fully 'user friendly' with colour and graphics to make life simple for the operator.
Part 2 (WEEKLY) or Part 3 (MONTHLY) is designed to handle the calculations of wages and N.I. It allows for standard pay, two overtime rates, optional pension funds (monthly only) other pay, holiday pay, bonuses, post-tax adjustments and no pay.
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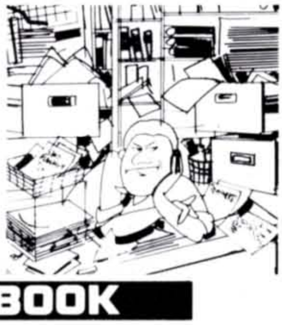
We are happy to quote for writing programs to suit your own specific purpose. Please telephone for details in first instance.



CASHBOOK

102 CASHBOOK £11.95 B C/D
FIRST CHOICE This is a double entry cashbook program showing cash and bank credits and debits, i.e. 4 columns. Any number of individual accounts can be used and analysed or totalled individually or cumulatively by associated group. A friendly but very practical, and reliable program which despite its low cost is used by many people in a range of situations from domestic and clubs to schools and businesses. MODE7
102d CASHBOOKd £19.95 B D
SECOND CHOICE This version of the above program uses random access disc files and can hold up to 1250 entries on 100K discs and up to 2500 on 200k discs. There is sophisticated protection against unauthorised use built in. MODE 7

102f ACCOUNT £29.95 B D
THIRD CHOICE This version of the above program uses random access disc files and can hold up to 1100 entries on 100K discs, and up to 2250 on 200K discs. Included is a choice of CASH/BANK or VAT/BANK headings. Over 830000 possible accounts combinations. Ledger sheets and summaries can be printed as well as full accounts. The latest balance is available at any time. This program is only available on disc MODE 7

Special Interest Items

NEW EXTENDED PAYROLL

Disc only version of our very popular PAYROLL with extensions to include three O/T rates, SSP, contracted in and out, pensions, personnel records and many other features – £49.95 + VAT.

ACCOUNT and CASHBOOK d PROGRAM OWNERS
Please note we can now offer monthly analysis feature. Return your disc with £10.00 for upgrade.

Top Spring Program

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Price £29.95 + VAT

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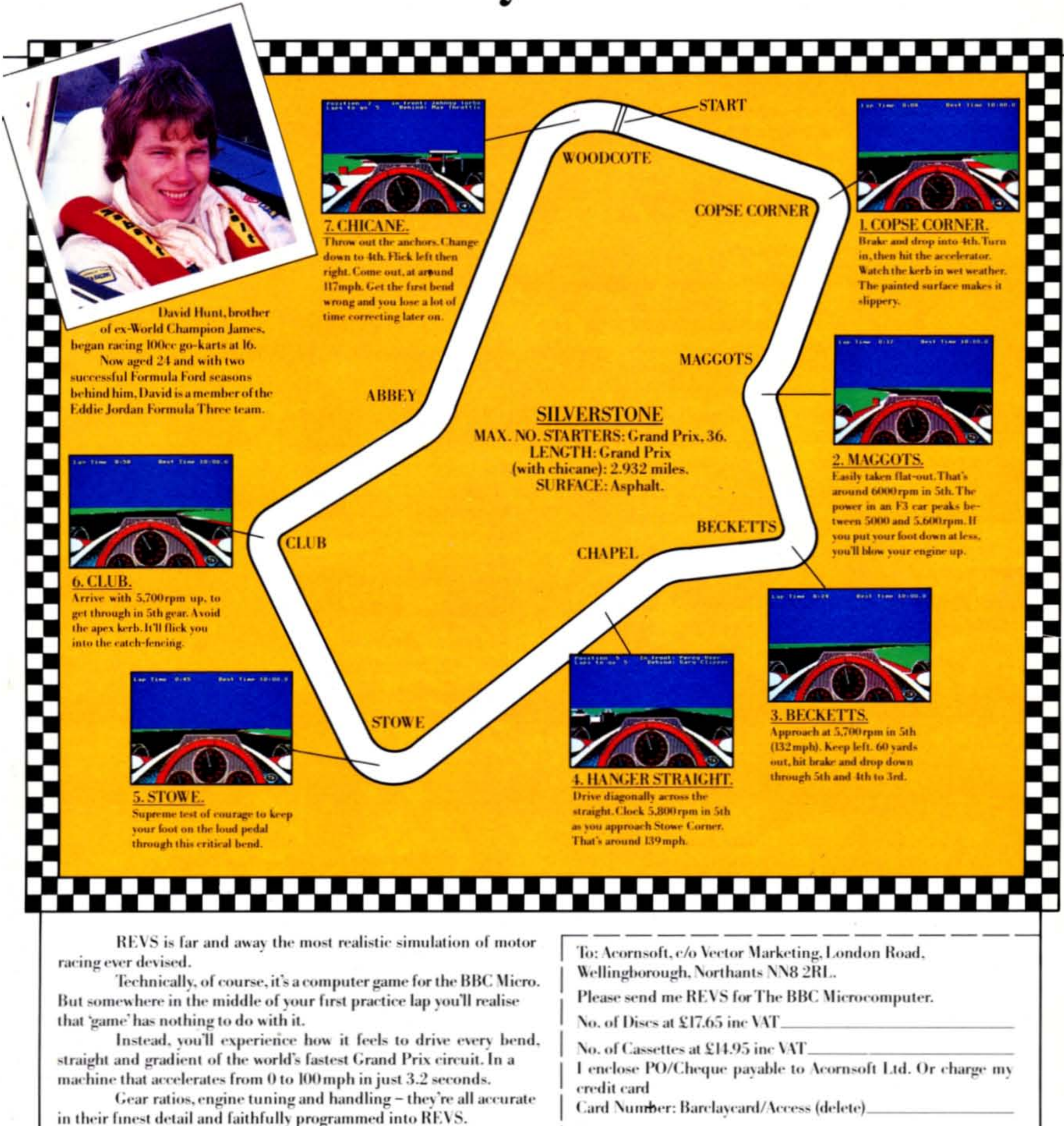
Before you go mad at Silverstone, let David Hunt drive you round the bends.



David Hunt, brother of ex-World Champion James, began racing 100cc go-karts at 16.
Now aged 24 and with two successful Formula Ford seasons behind him, David is a member of the Eddie Jordan Formula Three team.

SILVERSTONE
MAX. NO. STARTERS: Grand Prix, 36.
LENGTH: Grand Prix (with chicane): 2.932 miles.
SURFACE: Asphalt.

1. COPSE CORNER.
Brake and drop into 4th. Turn in, then hit the accelerator. Watch the kerb in wet weather. The painted surface makes it slippery.

2. MAGGOTS.
Easily taken flat-out. That's around 6000rpm in 5th. The power in an F3 car peaks between 5000 and 5,600rpm. If you put your foot down at less, you'll blow your engine up.

3. BECKETTS.
Approach at 5,700rpm in 5th (132mph). Keep left. 60 yards out, hit brake and drop down through 5th and 4th to 3rd.

4. HANGER STRAIGHT.
Drive diagonally across the straight. Clock 5,800rpm in 5th as you approach Stowe Corner. That's around 139mph.

5. STOWE.
Supreme test of courage to keep your foot on the loud pedal through this critical bend.

6. CLUB.
Arrive with 5,700rpm up, to get through in 5th gear. Avoid the apex kerb. It'll flick you into the catch-fencing.

7. CHICANE.
Throw out the anchors. Change down to 4th. Flick left then right. Come out, at around 117mph. Get the first bend wrong and you lose a lot of time correcting later on.

REVS is far and away the most realistic simulation of motor racing ever devised.

Technically, of course, it's a computer game for the BBC Micro. But somewhere in the middle of your first practice lap you'll realise that 'game' has nothing to do with it.

Instead, you'll experience how it feels to drive every bend, straight and gradient of the world's fastest Grand Prix circuit. In a machine that accelerates from 0 to 100mph in just 3.2 seconds.

Gear ratios, engine tuning and handling – they're all accurate in their finest detail and faithfully programmed into REVS.

You can even pre-set the aerodynamic profile of the car to suit your driving style.

So take our advice: before you try for the lap record at Silverstone, study David Hunt's circuit diagram.

After all, when was the last time you had a free driving lesson from a professional?

For the address of your nearest Acornsoft stockist, or to order REVS on credit card, call 0933 79300 during office hours.

Or send the coupon below to: Acornsoft, c/o Vector Marketing, London Road, Wellingborough, Northants NN8 2RL. Please allow 28 days for delivery.

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BU6

REVS FROM ACORNSOFT.

AMX MOUSE

Catch an incredible AMX MOUSE! The advanced opto-mechanical device that brings to your BBC micro facilities once only available on more expensive computers. Now you can use ICONS, WINDOWS AND POINTERS in your own programs.

AMX PACKAGE

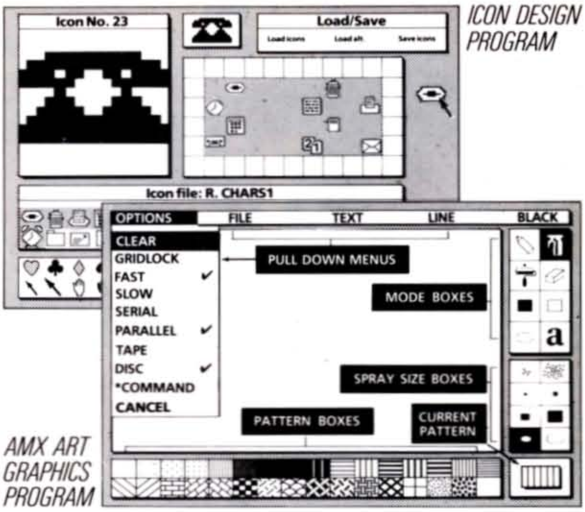
Plug the MOUSE into the user port, and the EPROM into your board. The latter contains fast machine code routines for creating on-screen windows, icons and pointers. And means that the MOUSE buttons can be progammed for use with commercial software such as Wordwise and View. There are two manuals included, explaining how to operate the MOUSE and the ROM routines, which are available in both basic and machine code programs.

Included in the package are two superb programs:

AMX ART has to be seen to be believed! It's a computer-aided drawing program that's just as good for serious applications–such as the preparation of detailed architectural and engineering drawings or teachers' worksheets–as it is for having lots of family fun! And if you're artistically inclined, you'll be astonished at the quality of work you can produce and save. It makes full use of on-screen menus, pull-down menus and icons: the ideal, easy way for novices to learn and gain in confidence.

ICON DESIGNER is an invaluable program for creating and storing icons for use in your OWN programs.

The AMX MOUSE may be used with any BBC Model B fitted with the Operating System 1.2; and it's compatible with the 6502 second processor and disc or tape filing systems.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ICON DESIGN PROGRAM

AMX ART GRAPHICS PROGRAM

New! AMX DESK

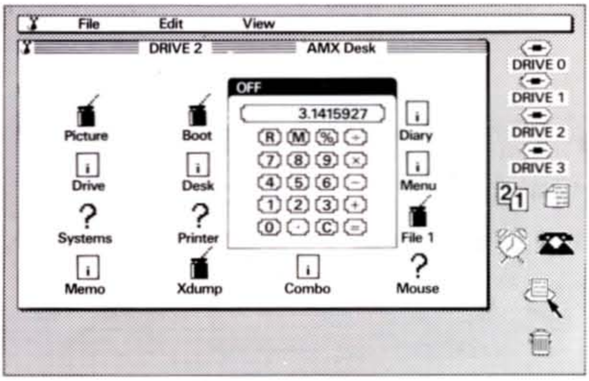
DISC ONLY £24.95 INC VAT

A terrific new program designed for the AMX MOUSE. If you want to get properly organised–at home or at work–DESK is for you!

The main screen contains a desktop with header offering SYSTEM, FILE and EDIT menus–plus an additional menu for extra features; and there's a constant time display.

Down the right-hand side are icons displaying Disc Drives, Memo Pad, Telephone Book, Diary, Alarm Clock, Printer and Trash Can. Simply by using your MOUSE you can select any service you require.

- MEMO PAD–Up to three pages of text may be stored. With printing at the touch of a button.
- TELEPHONE/ADDRESS BOOK–Up to 200 or 400 entries (depending on disc drive capacity) with handy scrolling search.
- DIARY–Displays a calendar for three months, centred on the current month, with scrolling backwards and forwards. Dates with entries are highlighted; select a date and view the entries.
- ALARM–Sounds at the time you've pre-set, whichever DESK service you're using.
- CALCULATOR–A full-function calculator can be brought on-screen at any time, and results can be stored for use in Memo Pad, etc.


File
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Diary
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Printer
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Memo
Xdump
Combo
Mouse
DRIVE 0
DRIVE 1
DRIVE 2
DRIVE 3

See us on **Mouse Links** on Viewfax tube link on Prestel: **Page No. *258216#**

Any window showing Telephone/Address Book, Diary or Memo Pad may be dumped to the printer by simply selecting the printer icon.

An interface program for Wordwise+ and View means pictures created with AMX ART can be merged with text upon printing out.

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Another remarkable new program for the AMX MOUSE. Now you can enjoy many drawing features you'd never expect to find at this price!

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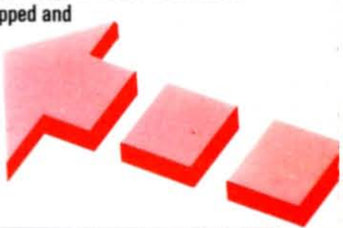
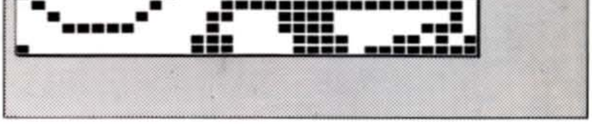


All disc software is available on 40 or 80 Track and 3" disc. Please state which you require when ordering.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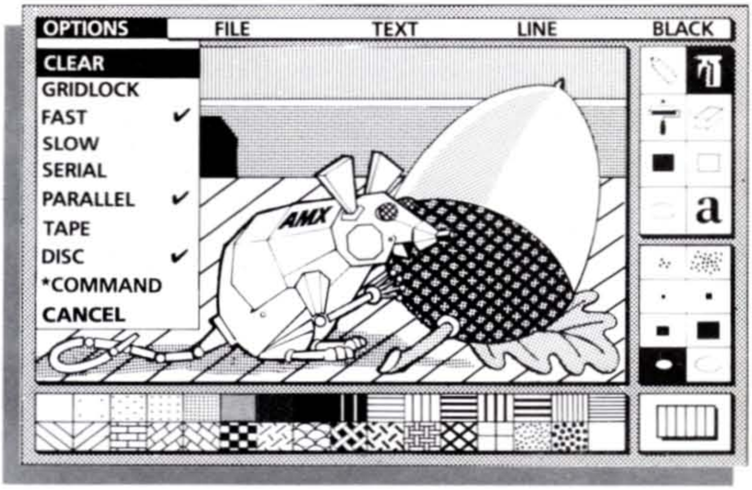
AMX MOUSE

POINTS THE WAY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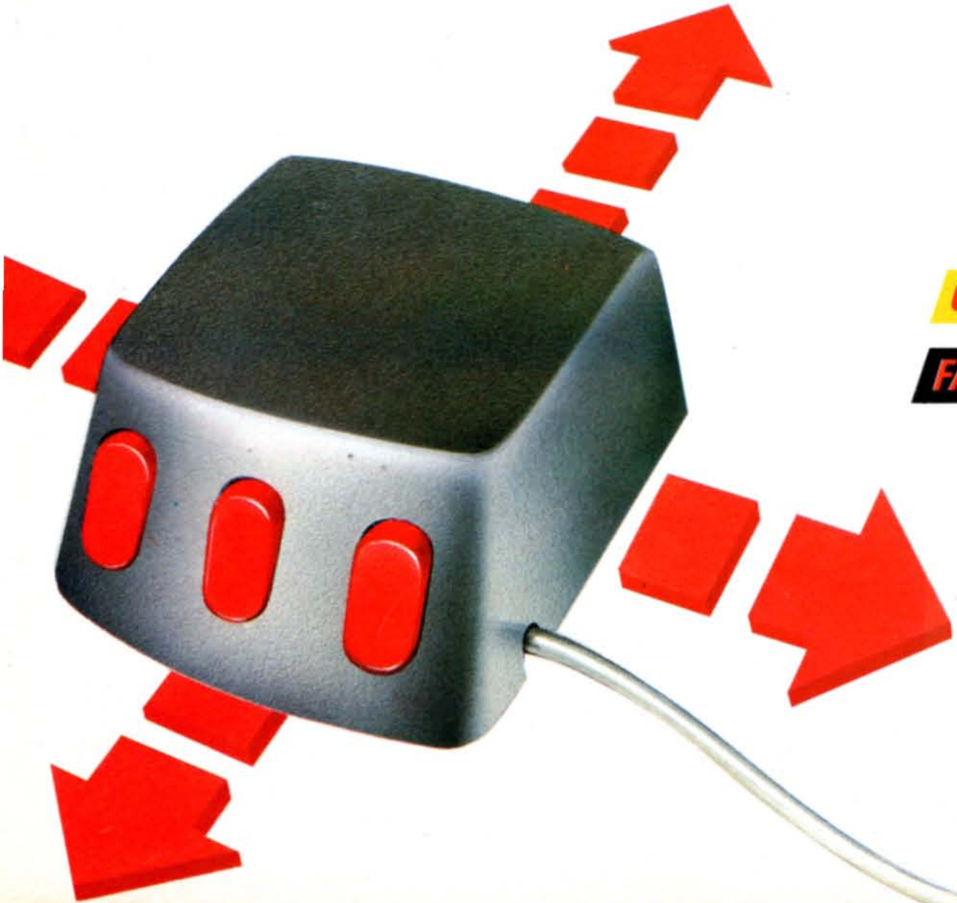
FOR THE BBC MICRO MODEL B

with AMX ART GRAPHICS PROGRAM

EDUCATIONAL QUANTITY DISCOUNTS



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- *Runs Elite, Mini-Office, Scribe, Starbase*
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Board + Acorn DFS + 8271	£95.00
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- ★ Fully compatible with any existing DFS and Torch CPN/MCP format.
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VISA

INTER-SHEET

The electronic spreadsheet program

Spreadsheet programs have become one of the most popular microcomputer applications in recent years. They can be thought of as a totally general purpose numeric tool, of use to anyone who has to handle figures, calculate costings, keep control of running costs, or just simple budgeting.

This package contains the ROM itself, a quick reference card, an introductory manual to spreadsheets and a comprehensive reference manual. Chip fitting instructions and a function key strip are also included.

The program has many quite unique features.

1) 40, 80 or 105 column screen display. The special 105 character screen mode displays more than any other spreadsheet.

2) Up to 16 spreadsheets may be stored in memory at once.

3) Data can be transferred from one spreadsheet to another.

4) Spreadsheet data can be transferred to and from popular wordprocessors such as WORDWISE and VIEW.

5) This package will integrate directly with other ROM-LINK compatible products, such as INTER-CHART, which can produce charts and graphs of data from the sheet.

6) Formulae in boxes are tokenised to save space. This means larger than normal spreadsheets can be accommodated.

7) Main menu enables even the inexperienced user to operate the more complex functions. There is no need to remember long command names.

These are in addition to many other powerful features such as: Variable column widths. Flexible replication facilities. Insert and delete rows and columns. Numbers may be printed in three formats. The number of decimal places is variable from 0 (integer) to 9. Locking/unlocking of boxes. Boxes may be justified left or right for numbers and left, centre or right for labels.

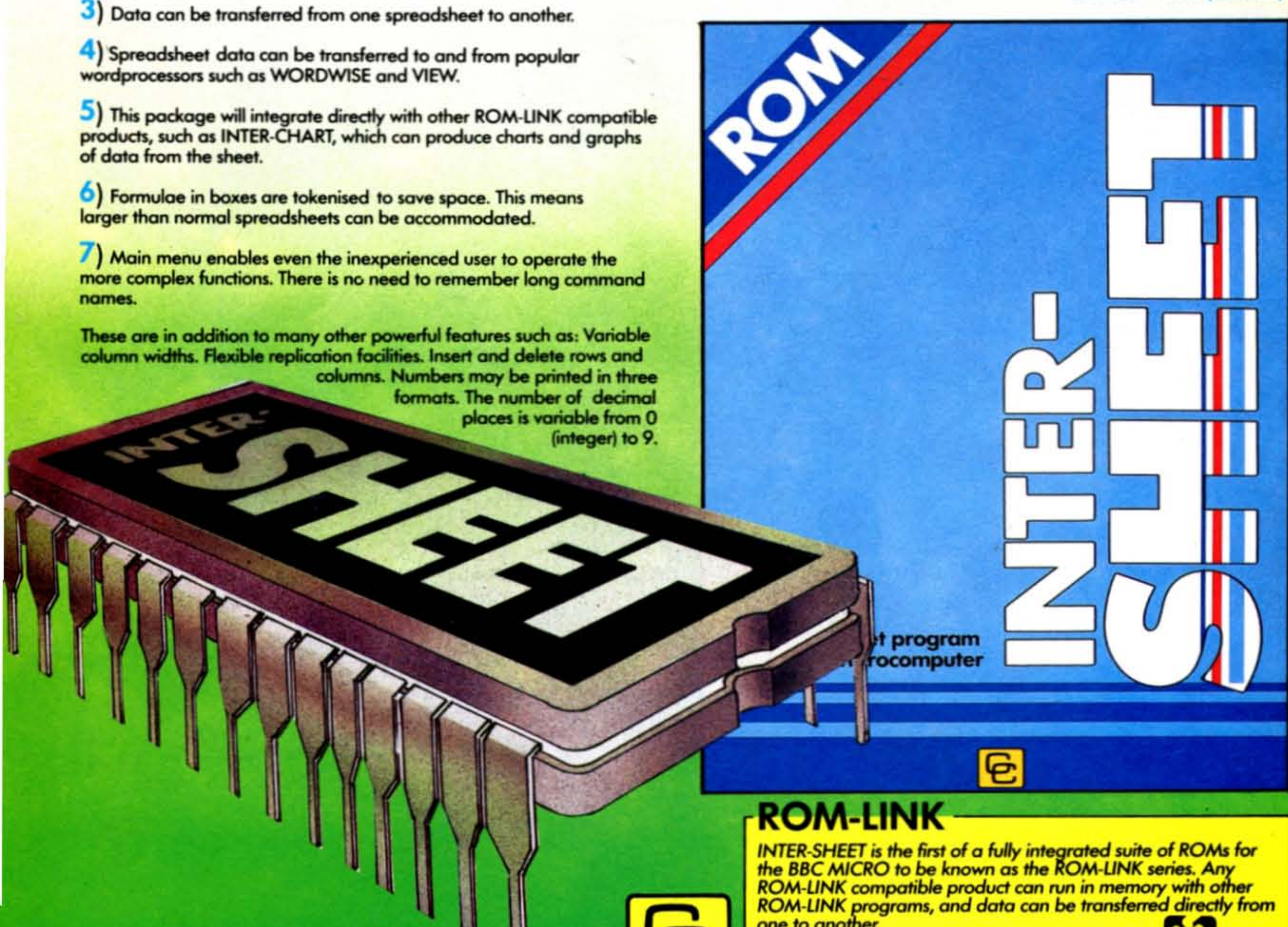
Most of the above features can affect individual boxes, rows, columns or the entire sheet.

INTER-SHEET supports a large range of high precision mathematical functions. These include all the more common functions such as SIN, SQR, TAN etc. but also include special sheet functions like SUM, MAX, MIN, LOOKUP, AVERAGE.

A special form of windowing has been included allowing any row or column to be held on screen as the sheet scrolls underneath.

All in all these features go to make INTER-SHEET the most powerful and flexible ROM based spreadsheet available for the BBC Micro-computer.

£49.00 + VAT (£56.35)



ROM-LINK

INTER-SHEET is the first of a fully integrated suite of ROMs for the BBC MICRO to be known as the ROM-LINK series. Any ROM-LINK compatible product can run in memory with other ROM-LINK programs, and data can be transferred directly from one to another.

ROM-LINK

Computer Concepts

Gaddesden Place, Hemel Hempstead, Herts. HP2 6EX (0442) 63933

TAKE A TEST FROM THE RANGE

So now you have got your home computer, you're ready to talk to Cumana – the best name in memory. Already a market leader throughout Europe for their range of disk drives, Cumana now have other products on offer, all to the same exacting standards that have made their disk drives the number one choice in the home and in education.

The Touch Pad

The Touch Pad is a low-cost graphic plotting aid for the BBC micro. This compact display cursor moving device simplifies programming with the touch of the stylus.

The product comes complete with an instruction booklet, basic software, stylus and connecting cable. Its uses are in graphics, computer aided design, education and games.

£69.95
including VAT.

CUMANA
PEN DOWN
ON
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CUMANA 0
CUMANA 0
CUMANA 1
CUMANA
DISK DRIVE GUIDE
CUMANA
THE MARK OF SAFETY
BS415

BE SAFE NOT SORRY

Cumana's CS range of single disk drives have been subjected to the strict safety demands of the BEAB.
They have now been awarded BS415 approval, so if you value safety do not trust it to anything less than Cumana.
Cumana's dual range of disk drives have also been submitted for approval.

Disk Drives

Cumana have spent years on research, development and marketing a range of drives second to none. Their drives are compatible with BBC, Spectrum, Dragon, Oric, Tandy Models III and 4 and Video Genie. They are fully guaranteed for 12 months and approved for electrical safety by the D.M.E.E. and are extensively used in GLC and ILEA establishments. Cumana were the first independent disk drive supplier and are now Europe's market leader. Their products have been proven in the schools, universities and homes throughout Europe. Let us drive you in the right direction, send now for further details of the Cumana range, or see them at our distributors and at selected branches of W.H. Smith, Lasky's, Greens, Currys, and Spectrum UK.

DRIVE CUMANA

acorn electron

The Acorn Electron Computer
A microcomputer with a proven track record. Using BBC Basic, the Electron was developed out of the Micro that has been chosen for over 80% of schools participating in the Government's current Micros In Schools project. It connects into almost any TV set and cassette player and is supplied with a comprehensive User Guide which runs through, in a simple to follow manner, the basic principles of programming. A wide range of software is available, including games, educational packages and home accounts.

Disk interface now available for the Acorn Electron, Spectrum and Spectrum + and Dragon 32/64, details from Cumana

£149.95 including VAT.

Diskettes
Only when Cumana found a double density diskette up to their stringent quality control requirements, and at a price that made sense to the end user, were Cumana ready to put their name to it.

The result was a top quality diskette, complete with a plastic protective case for the ten-pack (they are also sold in two-packs!) together with index stickers.

Cumana diskettes are available now in both 5¼ inch and 3½ inch as single or double-sided, 40 or 80 track, from your local computer dealer. Don't trust it to chance, go for the best name on record.

Cumana BBC Microcomputer compatible disk drives:
Cumana disk drives supplied with formatting diskette, drive connecting cable and Cumana user guide. Independent power supply, mains lead and moulded plug included.

CS100 40 Track single sided (100K)	**£164.95**
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CS200 80 Track single sided (200K)	**£192.95**
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CD200 2 x 40 Track single sided (200K)	**£294.95**
CD400D 2 x 40 Track double sided (400K)	**£325.95**
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Cumana disk drives with independent power supply, mains lead and plug. Excluding other accessories.

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Cumana disk drives supplied with formatting diskette and Cumana user guide. Power supply taken from BBC Microcomputer, with lead supplied.

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The 'CS' range comes complete with power supply.

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Available from the following retail outlets: W.H.Smith, John Lewis Partnership, Greens Leisure, Laskys, Spectrum UK.

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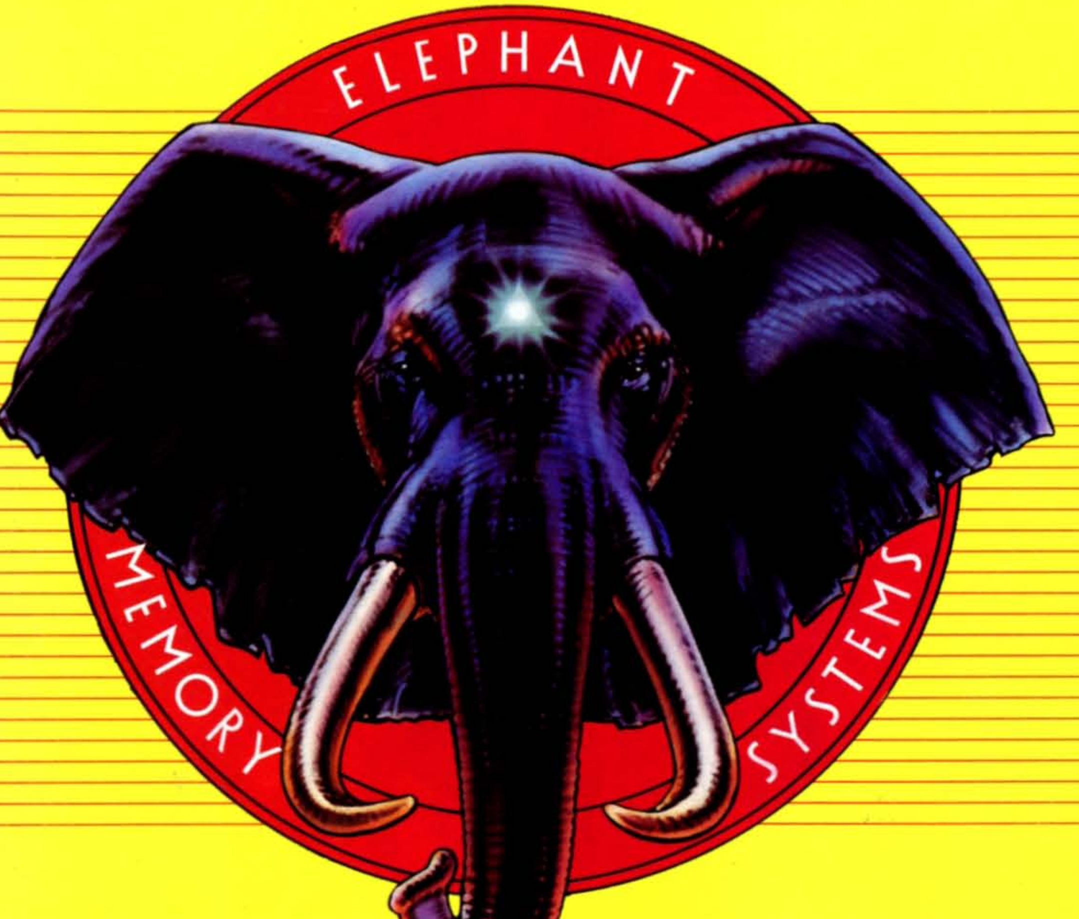

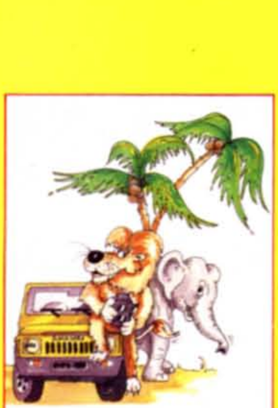

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Look for your participating ELEPHANT Dealer's special Competition Display and pick up a simple puzzle card with your purchase. Send it to us with an ELEPHANT 10-pack top to receive, completely free, an ELEPHANT 'T' shirt and an opportunity in this exciting competition. Each subsequent 10-pack purchase and completed puzzle card gives you another opportunity – there's no limit!
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THE MICRO USER
NEWS
June 1985

MicroLink's big breakthrough

A UNIQUE announcement in last month's *The Micro User* resulted in a postbag of almost 1,000 letters in less than a week.

The staggering response was due to the launch of MicroLink – a dramatic breakthrough on behalf of all UK micro users.

Following weeks of secret talks, Database Publications had agreed an exclusive nationwide cost-cutting deal with Telecom Gold.

"It means that this service will no longer be just the domain of the well heeled businessman", says Derek Meakin, head of Database.

"For we have now brought Telecom Gold within the budget of every home computer owner".

As a subscriber to MicroLink, computer buffs pay a one-off registration fee of £5, plus a standing charge of £3 a month. This is compared to Telecom Gold's usual £10 per month minimum charge.

With MicroLink, almost everyone will be able to access Britain's national database via PSS for the cost of a local call.

It will also provide subscribers with a personal electronic mailbox, giant bulletin board without queueing, free telesoftware and free access to MicroSearch, a revolutionary product locater.

And – for a bonus – there will be a regularly updated news service covering all that is happening in the world of the BBC Micro.

"We believe we couldn't have worked out a better deal for micro users with Telecom Gold", says Derek Meakin.

"This will open up a whole new world for our readers".

ACORN ADDS A+ TO THE MODEL B

AFTER months of intense speculation, the enhanced version of the BBC Micro has at last been launched – and the good news is that it's in the shops now.

The Model B+, as it's known, has confounded the pundits by being very different from their predictions.

Tales of 128k paged memory, new ULAs and ADFS as standard have proved to be nonsense.

In fact, as its name implies the new model is more of an intelligent extension to the BBC Micro range rather than a radically different design.

The Model B+ comes supplied with DFS as standard, with Tube software incorporated. The increasingly scarce 8271 floppy disc controller has been replaced with the WD1770.

However, rather than opt for a dual density approach which would provide major compatibility problems for software suppliers, Acorn has used the chip in single density mode.

Nor does the command set of the new DFS differ radically from the old, save for formatting now being included in ROM.

One major difference in the new machine however is the provision of 32k of banked RAM for screen memory.

Switched on with *SHADOW or by adding 128 to the MODE command, the extra memory frees up to 20k of RAM normally used for screen display for programs.

Again, to ensure compatability with existing software, the extra RAM can easily be deactivated.

Incorporating these changes has entailed rearranging the board somewhat, and the opportunity has been taken to make some improvements.

The sideways ROM sockets have increased by one to six, and are now capable of holding 32k ROMs.

Taking advantage of this the OS and Basic ROMs have been combined into one single 32k chip. The OS appears virtually the same as OS1.2, with small changes to support the banked RAM commands.

Other changes include full buffering of the Tube I/O, the cleaning up of the 1MHz bus glitches, and a change to all non-socketed chips, to improve reliability.

One other enhancement is the replacement of the 6502 with the 6512. Transparent to the user, its improved clock circuitry means cleaner timing signals throughout the board.

Said Acorn's John

Turn to Page 24

No price cuts

ACORN'S new baby, the model B+, has bounced onto the scene complete with DFS at a cost of £499.

However the company has no plans for the moment to provide a cassette version of the machine.

"We believe the market is moving away from the cassette option", John Caswell of Acorn told *The Micro User*.

Nor will the arrival of the B+ result in price reductions for the model B itself.

"There will be no special offers", said Caswell, "we are not in the business of discounts.

"Acorn will have rigid pricing policy from here on in. And with the B+ we believe we have the right machine at the right price".

ADVANCE ORDERS FLOOD IN

ADVANCE orders for the model B+ were reported to be heavy even before the new machine hit the streets.

One distributor based in the North of England, Eltec of Bradford, received requests for 250 units in just one week.

And that was almost a fortnight before the official launch date of May 1.

Similar stories came from all over the country.

"The orders came from dealers who were obviously impressed with the specs Acorn allowed us to give them", said Catherine Tweddle, Eltec's managing director.

All Acorn's distributors and direct dealers had been let into the secrets of the B+ some time before it was unveiled.

This is part of the revamped Acorn's policy of offering a new deal for wholesalers, retailers – and users.

Opportunity

"We wanted to make sure everyone had the opportunity to get hold of a machine during all the launch publicity", said John Caswell, Acorn's head of marketing, Consumer Division.

"Too often in the past, machines have arrived in a blaze of publicity – then it's proved impossible to get your hands on them for weeks".

As a distributor for Acorn products for ten years, what does Catherine Tweddle think of the new machine?

"Judging from the reaction so far, it looks as though they are once again on to a winner", she said.

CUT-PRICE SOFTWARE OFFER IS PROBED

LEADING publishers of BBC Micro software, including Acornsoft, are investigating a mail order operation offering top selling games at rock bottom prices.

Famous titles like Elite, Castle Quest, Micro Olympics, Football Manager and Combat Lynx are involved.

The software houses were alerted by readers of *The Micro User* who had received postal offers from A1 Software Services of Hornchurch, Essex.

The mail shot said: "Dear Sir, this is the best software offer you will ever receive. Please note, this is your one and only chance to take this offer".

It then went on to invite people to choose one from a list of 20 well known games which would be theirs for only the cost of postage and packing – 25p.

The offer continued: "When you have received your free tape you can buy the following" and gave details of three packs, each containing 15 top games. Price for one pack was £20, for two packs £30 and for all three £40.

Another version of the mail shot offers a choice of 21 packs containing five games each at prices ranging from £5 for one pack to £30 for 10 packs.

The offer states: "All titles are the ones from the well known software houses. All copies are first class quality and we will exchange any non-loaders. Please be very descrete (sic) with this list".

Acornsoft's head of technical services, John Collins, told *The Micro User:* "We are taking this very seriously indeed and have sent off for some of the software which carries the same titles as our own.

"If there is the slightest evidence of piracy or other unlawful activity by this firm our legal department will take over".

Simon Vout, proprietor of Software Invasion, another publisher whose games are listed on the mail shot, said: "I've sent a copy of the offer to my solicitor and I'll be monitoring the situation very closely".

The Micro User tried to contact A1 Software Services by telephone. Directory enquiries could find no listing in Hornchurch for the firm, nor for an "A. Croft" named as proprietor on the mail shot.

A representative of *The Micro User* who called at the Hornchurch address found it to be an accommodation service-cum-escort agency located in a run-down shop.

The woman in charge said a "youngish" man had been picking up mail addressed to A1 Software Services.

ACORN CLINCHES £1 MILLION DEAL

ACORN'S newly-created business division has clinched a deal worth £1 million with Reuters.

It is to provide a low-cost microprocessor capable of adding local processing power to Reuters' 40,000 monitor installations world wide.

Designed to the international news agency's specification, the new machine will convert the monitors into intelligent data and graphics workstations.

They will be used to handle the latest generation of information services being developed for the foreign exchange and commodity markets.

Reuters had previously acquired 1,300 standard units from Acorn, of which more than 800 have been installed.

Already there are customers in Europe, the Far East and Middle East, Japan and North America.

Now Reuters has commissioned Acorn to design and build an initial quantity of 1,000 units to a significantly improved specification in the Eurocard format. They will be delivered later this year.

Mike Tweedie, sales director for Acorn's Business Division, said: "This deal is a breakthrough for Acorn, made possible through our considerable technological expertise.

"The OEM market offers immense opportunities to Acorn, and the Reuters contract has given our newly-formed Business Division a firm base from which to win new orders".

Enhanced BBC Micro

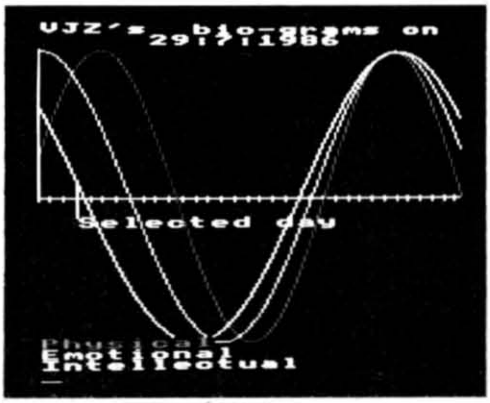
From Page 23

Caswell, Head of Marketing, Consumer Division: "We feel that the Model B+ will find a ready market place in home and small business applications.

"Previously disc based models have found wide acceptance in these areas as word processors, spreadsheets and communications systems.

"There's tremendous potential here, especially for the new Model B+. The increased workspace given by its larger memory makes it ideal for these serious applications".

The new look BBC Micro has been received enthusiastically by software houses and users alike. Said one leading software house: "Acorn have got it just about right. They've made sensible improvements where needed, and yet have avoided giving us major incompatability problems".



How do you tick today?

NEED help in choosing a mate? Want to find out what makes the boss tick?

A menu-driven suite of bio-rhythmic analyser programs from Gilvale Software could be the answer.

Super Teams are programs for the BBC Micro that derive and interpret bio-rhythms – measures of human performance capability – preparing compatibility studies covering physical, emotional, intellectual or averaged bio-rhythms for groups of up to 15.

Studies into the effects of bio-rhythms on aspects of family life, sports and work performance can be carried out.

Person-to-person compatibilities can be used to select a suitable mate, boss or job. Genealogists can investigate the bio-rhythms and compatibilities of their ancestors. Historians can unravel the impact of these rhythms on important figures and events back to 1752.

Super Teams are also an aid to recruiting techniques, team-building and accident-prevention.

Sports enthusiasts can use the suite to help them attain optimum performance.

Price is £10 for the 40-track disc and £11 for the 80-track dics.

MORE ROBOTS MOVE INTO EDUCATION

Cyber Robotics' Paul Ritson enjoys a drink with his Model 310 educational robot

ACADEMICS are getting to grips with the world of robotics – thanks to a little help from the BBC Micro.

Two companies which have recently jumped on to the educational bandwagon with products geared to the BBC machine are TecQuipment of Nottingham and Cyber Robotics of Stone.

The Open University wanted an educational robot capable of being programmed for common industrial uses, thereby providing a good training tool.

So TecQuipment launched the MA2000 and OU ordered 150 to use in their two new courses, robotics in manufacturing and in computing.

The MA2000 has six axes – waist, shoulder and elbow being the major three, and pitch, yaw and roll. They allow for greater flexibility and freedom of movement and in turn enable a wider variety of tasks to be performed.

It is fitted with a pneumatic gripper to which a wide range of tools can be attached so various jobs can be carried out including parts handling, paint spraying and stacking and palletising.

Software available for the BBC Micro allows for up to 100 program steps to be taught and includes a 30-step interactive tutor program.

Taking into account the various discounts available to different users, the average price is £3,000 to £3,500.

In a move to boost its share of the education market, Cyber Robotics is offering £200 worth of free software with its £650 Model 310 robot.

Takeover

Cyber introduced the price cut after their takeover by J. Bibby Science Products and a subsequent injection of new capital.

The 310 has five degrees of movement, plus gripper action, and, unusually for robots in this price range, can rotate its shoulder 300 degrees vertically.

Educational robots usually work by specifying which joint to move and by how much. The free application package simply describes a position in space and the approach angle of the gripper.

Piracy forces firm to stop using tapes

THE tremendous popularity of the BBC Micro in schools could sound the death knell for educational software, warns David Clare, managing director of Clares Micro Supplies.

"Our schools are a hotbed of piracy, often with the active encouragement of teachers and quite often by teachers themselves", he claims.

Clare told *The Micro User* that two major problems prevented software producers profitably establishing themselves in the educational market.

"Firstly, as computer users – particularly teachers – become more experienced and computer literate, they are demanding a far higher standard of software than ever before.

"To produce such software requires higher development costs and longer lead times, all of which is acceptable if the program yields the expected return on investment.

"But the second problem – piracy, leakage or whatever label you wish to put on it – results in diminished returns for the software producer.

"The ridiculous arguments used by pirates to justify their activities are laughable – such as 'all software should be free', 'why should they be paid for programming, I could do it better?' and 'give them a fixed fee'. It is still stealing", says Clare.

He claims the education sector now has its own form of Mafia in the form of district advisers, county advisers and other officials who evaluate new software.

"This means that before your software is considered you have to issue about 500 free samples which are invariably copied", he said.

The result for Clares Micro Supplies has been to withdraw from educational software, particularly on tape.

"We still supply many of our disc-based programs to schools, colleges and universities, but by their nature these programs are going to responsible people", says Clare.

"Most teachers are honest, but there are others who will give the profession a bad name, and I'm sure there are many who don't realise that they are committing an offence".

Smiths pick Mini Office

MINI Office, the chart-topping software package for the BBC Micro is being used as a teaching aid by leading UK computer retailers, W.H. Smith.

A finalist for two major categories in the 1985 British Microcomputing Awards, Mini Office has been selected to bring the message home to W.H. Smith staff that computers have a serious application.

The company is using the program in its mobile training classroom, now on a nationwide tour. By the time the vehicle has completed its circuit thousands of W.H. Smith's computer and related staff will have used the package.

"We have a lot of staff and we want them to know what the goods they are selling are capable of", said a training division spokesman.

"They are not employed just to wrap up goods but to inform the customer of the computer's various applications. The computer is not just a toy".

W.H. Smith chose Mini Office because its four programs – word processing, database, spreadsheet and graphics – emphasise how easily a computer can be turned into an inexpensive office tool.

"At its revolutionary low price of £5.95 Mini Office is a truly cost effective way of introducing the business concept of computers to our staff", said the man from W.H. Smith.

"Naturally we are delighted that the computer retailing giant has demonstrated its faith in our product in this way", says Derek Meakin, head of Database.

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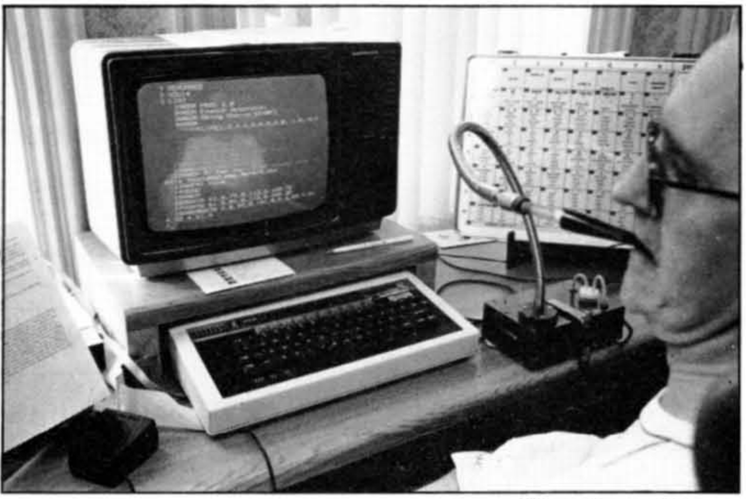
BBC aids job-hunt disabled



This suck or puff device operates a BBC Micro via a Possum scanning keyboard emulator.

Picture: Stuart McKears

SEVERELY-handicapped and disabled residents of Cheshire Homes are using BBC Micros to entertain, educate and train themselves for jobs. With backing from the Manpower Services Commission, Robin Nixon and Steve Ludlow have set up extensive computer facilities at two Cheshire Homes – Seven Springs and Heatherley.

To "interface" a resident to a BBC Micro may need individual input controls, and these are produced in workshops at each Home.

The computer software may also need to be modified, and this too is done on the premises, with the new versions being made available to other Cheshire Homes.

Experience to date has been highly encouraging, say those involved in the scheme.

Computers have helped people with poor control to write perfect letters and produce geometric computer graphics.

The games that are often the start of computer interest have helped residents develop control and dexterity.

Worthwhile jobs can be performed by residents – helping with the accounts, for example, or organising fund-raising projects.

They are better able to follow educational courses, both in mathematical subjects and the arts, including languages. Spanish is a favourite course for use on holidays.

There are, of course, some who are not at all interested in computers and are happy to leave new technology to others. This is accepted and respected.

But, for many, computers like the BBC Micro are proving valuable and adaptable communications devices, and a means to pursue other interests.

A programme called COMPAID – Computer Aid for Speech-Impaired and Disabled People – was started by Lorna Ridgway, then chairman of management, at Seven Springs early in 1982.

Robin Nixon told *The Micro User:* "To get the project under way we converted an old storage room into a computer room and took on eight previously unemployed trainees on a part-time basis under the Opportunities for Volunteering scheme.

"Under the tuition of Stuart McKears, the computer tutor, the trainees' tasks were to learn the basics of programming and computer use, and in turn pass these on to the residents.

Difficulties

"As readers of *The Micro User* may remember from the article 'Alternative Input' in the October, 1984, issue, we were mainly concerned with solving the communication difficulties of some of our more severely disabled residents.

"At first there was only one readily-available program, but the situation eased with the advent of the BBC and Electron micros with their extensive software range.

"One of the first programs we wrote for the BBC Micro was a large-letter word processor to help visually-impaired people to read.

"After discovering the flexibility of the BBC's graphics, we undertook a switch-operated drawing program called Rainbow.

"Having ascertained that two switches were the maximum that our most severely disabled residents could easily use, we set about writing some games to help with the assessment and improvement of co-ordination.

"One such was Sqwhere, featured in *The Micro User* in August, 1984, in which the player has to manoeuvre a bouncing ball into a box by changing its horizontal and vertical directions of movement, using one of two switches.

"Another, newer program, Space Base, is a fast action "shoot 'em up" game which can be operated via two switches or the keyboard.

"The concentration involved in these games has helped to improve some users' co-ordination to a measurable degree".

CUMANA DRIVES SIZED DOWN

IN line with miniaturisation trends, Cumana has designed a range of 3½in disc drives for the BBC Micro.

A 40 track drive gives 125k of unformatted single density capacity – 250k in double density recording mode.

Top of the range is a dual drive offering 2 × 80 track drive and a total storage capacity of 2 Mbyte unformatted in double density recording mode.

The drives are Shugart SA400 compatible and have a fast head positioning time. The direct-drive brushless motor is said to provide maintenance-free operation.

Head positioning, track zero and write protect are controlled by an on-board microprocessor and discs can be write protected by removing a tab.

Acorn goes Spanish . . . in Mexico

AN Acorn-designed, Spanish version of the BBC Micro has gone on sale in Mexico.

Called the Micro-BBC, it has a Spanish operating system, documentation and software.

The large Spanish-speaking population of the US are also potential customers for the machine.

However, although Acorn International managing director Bob Bayham says the machine "has been enormously well received" in Latin America, company chairman Alex Reid is said to be preaching caution over its potential in the US.

OFFER TO OWNERS

A FREE quarterly subscription to Prestel and Micronet is on offer to any BBC Micro user who buys a Tandata modem and BBC micropack up to July 31.

The free subscription is also available to purchasers of Tandata's viewdata controllers intended for use as modems, together with the appropriate BBC software.

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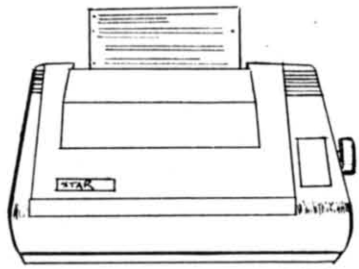

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Acorn Electron Business Pack with view/view sheet	**239.00**

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Mouse brings in eight colours

ANOTHER mouse for the BBC Micro is about to be launched by SMC Supplies at £59.95.

It gives eight colours, various brush shapes, air brush, fine point, rubber band straight lines, triangles, circles, box, fill, variable size text, panic button, save and reload to/from either tape or disc, and a fully shaded fast screen dump for most Centronics printers.

A sprite designer and character designer are also included and shapes created via these may, through use of a control utility, be integrated within the user's own programs.

The mouse can be used in Mode 7 and less memory is used in the creation of graphics than in the conventional manner. Most joystick-compatible BBC programs will take advantage of the mouse's capabilities, says SMC.

Think quicker

AN enhanced version of Quick Thinking from Mirrorsoft has been released for the BBC Micro.

Quick Thinking Plus challenges the user's mental arithmetic skills in a two part program.

Multivaders, which puts the player in charge of a robot invasion prevention force, requires quick thinking as addition, subtraction, multiplication and division tasks have to be completed within pre-specified limits.

Robot Tables requires speedy multiplication to make robots good enough to pass inspection by the quality controller.

The program costs £6.95 cassette, £9.95 disc with new for old upgrades costing £2.50.

Five only just miss a Space-shot

FIVE young scientists from Dr Challoner's Grammar School, Amersham, used their BBC Micro to design an experiment which nearly ended up in space.

Their entry was one of the six finalists in the Experiment in Space competition organised by Independent Television News – the first prize being the opportunity to test their theories on a forthcoming flight of the NASA space shuttle.

The five, led by teacher Chris Clare, are 17-year-old Jim McPherson, Ashley Saulsbury, John Cansdale, 15-year-old Rufus Grig and Mike Calviou.

Their idea was to study the behaviour of convection currents in micro-gravity conditions, the results of which could lead to design of more efficient domestic heating systems.

The circulation of warm air currents has always been difficult to monitor and the boys were hoping their experiment would further theoretical understanding of the convection process.

Such information could influence manufacturing processes for radiators and heat tanks and also provide guidance in locating them in the most efficient positions.

The plan, one of the three non-life experiments to reach the final six of the competition, was to take accurate readings of warm air movement in space with strategically placed temperature sensors.

The experiment was illustrated for the judges with a display of computerised graphics programmed on the school's BBC Micro.

This compared the accepted behaviour pattern of currents in the atmosphere with the likely behaviour in a low gravity situation.

In the event the experiment was not chosen to be sent into space, but the boys had the consolation of lunch with science writer Arthur C. Clarke and two of the nominated British astronauts.

They also received a special certificate as a record of their achievement, a scale model of the space shuttle, autographed copies of Clarke's book "2010" and sets of NASA memorabilia.

IT'S DOWN-TO-EARTH RIBBON . . .

SOFTWARE publisher CDS has taken over MRM Software and set up a new company called Blue Ribbon Software to produce a range of budget programs for the BBC Micro selling for £2.50 each.

Giles Hunter, managing director of CDS said: "We are aware there is a definite market for the budget priced range of programs for the BBC Micro and we are now in a position to offer a number of well established games".

Banana
INPUTS

A BBC Micro computer interface for control purposes in educational, industrial and home use has been launched by Castle Associates.

The Banana interface has been developed with the cooperation of craft, design and technology teachers, says the manufacturer, specifically for teaching control technology, modular technology and computer control applications relevant to industrial practices.

It comes with a user handbook containing tried and tested experiments and programs. A full range of specific experiment hardware and software will also be made available, says Castle Associates.

Price is £175.

A new Gold standard

TELECOM Gold has extended its telex facility to enable customers to receive incoming telex messages on their mailboxes.

Incoming telexes are sent to a central telex number and routed automatically through to the recipient's Telecom Gold mailbox number.

This gives Telecom Gold subscribers the additional advantage of being able to receive telexes confidentially and without delay, in the office, at home or while travelling.

The telex can be acknowledged or replied to instantly, be forwarded on to another recipient or electronically filed for future reference.

A simple routine is also available which will convert standard telex upper case format into lower case, making text simpler to edit.

Complex text can be prepared, edited and sent to both electronic mail and telex users from a BBC Micro, without rekeying the message.

Directories of familiar names can be organised to simplify addressing of telexes, and the facility to set up distribution lists enables simultaneous transmission to up to 500 different recipients.

SHARING RAM

A NEW sideways RAM/emulator from J.P. Designs has all the advantages of most other RAM units on the market but also allows the RAM to be shared by other external systems, says the manufacturer.

The 16k static RAM is located between 8000-BFFF H in the system memory map and can be written to directly – allowing machine code programs to be placed in the RAM by the assembler.

A slide switch located on top of the unit determines which system has access.

Price: £99.95.

JOYSTICK and interface supplier Kempston Micro Electronics has entered the software market with Chicane, first of a series of action games for the BBC Micro, designed to mirror the thrills of Formula Ford 2000 motor racing.

Written by software house Orpheus, it was compiled under the guidance of the Kempston Micro Racing team's drivers and mechanics. There is a choice of six actual Grand Prix circuits and keyboard or joystick control.

Chicane involves choosing one of six Grand Prix circuits and entering into a qualifying lap, tested against the qualifying times of the real circuits.

Price is £7.95.

● Pictured are Kempston managing director Ab Pandaal (left) and Orpheus director Paul Kaufman with one of the Kempston cars.

Learn music on a micro

A METHOD of learning music perfected with the aid of a BBC Micro has just been made available by Hungarian-born teacher Andras Ranki.

Ranki, a regular reader of *The Micro User*, told us: "The key to learning to read and write music is development of the musical ear.

"Listeners and musicians, whether beginners or accomplished players in classical or pop fields, need to train their ear to relate written music to sounds.

"My teaching method involves a unique mnemonic system designed to enable students to sing by sight, to identify notes and chords by hearing, and to 'inner hear' written music.

"During my first year as a teacher I noticed students' difficulties in hearing and sight-singing came from the lack of a consistent method of association between sound and notation.

"So I started to develop my system for beginners based on the Kodaly system I had been taught as a child in Hungary.

"Then, in response to the needs of my advanced pupils, I expanded the system to include chords, modulations and other refinements for which I designed an electronic learning aid.

"My first machine was housed in a tobacco tin, and a progression of similar home made equipment gained me a certain notoriety for turning up in class with part functioning and malfunctioning gadgets.

"However I'm happy to say that the whole system has been gradually polished on my BBC Micro over the past two years until it is now ready for the public".

Ranki recently embarked on saturation courses in his system – called Z*N*K – at the end of which students are able to sing melodies by sight and identify notes and chord sequences by ear.

Practical applications of Z*N*K are being expanded and geared to guitarists, arrangers, choral singers and children.

Says Ranki: "At the moment the software involved in my system is not available to the public, but soon I hope to market it so other teachers and music students with BBC Micros can benefit from my developments".

Time to teach the children...

A SOPHISTICATED learning program which helps children understand the relationship between the 12 hour analogue and the 24 hour digital clock has been released by Applied Systems Knowledge.

Time Trucker is a first time skill program incorporating graphics, music and rewards for achievement.

To ensure children can acquire the learning skills at their own speed, Time Trucker incorporates three ability levels with separate games called Trainee Trucker, Trucker and Super Trucker.

In each game the player is given a contract which must be assessed in order to collect the required fresh farm produce from the country and return to the depot within a specified time limit. Price is £9.95 on tape and £11.50 on disc.

MAGIC SPELL!

FIVE new additions to the Watford Electronics range of BBC Micro peripherals have been launched at the Electron & BBC Micro Show at the New Horticultural Hall, Westminster.

Romspell is a ROM-based spelling checker for use with both View and Wordwise. The dictionary disc comes with 30,000 words and manual. Price: £25.

Romas is a ROM-based development package for the generation of assembly language programs on a variety of "target" processors with the BBC Micro as the host.

Processors supported by this system include the 6502, 65C02, Z80, and 6809. The package includes a full macro editor and cross referencer. Price: £45.

Transferom is a ROM allowing the user to transfer protected tape files to disc for rapid recall at a later date. The package is fully menu driven and costs £22.

Diagnostics is a menu driven "doctor disc" allowing selection of a range of test functions to diagnose problems with the BBC Micro.

It covers RAMs, ROMs, ULAs, sound, keyboard, disc interface, RS423, ADC, user port, cassette, joystick, speech, disc drives, 6502 and Z80 second processors and costs £15.

Colour Art is an addition to the AMX Mouse package, allowing the user to take any mode 1 or 4 picture and add colours and shading effects from a palette of up to 255 different patterns. Price: £13.

Mouselink

A NEW section on BBC Micro owners' Prestel information service Tubelink is devoted to the AMX Mouse and contains free telesoftware.

The Mouselink team is Benjamin Rietti, John Snelgrove and Ray Hughes and their new Viewfax service includes news, hints and tips, programs and problems relating to the AMX Mouse.

QUALITY NEVER LOOKED SO GOOD–

Now everyone with a BBC or IBM PC will want to get their paws on CUB's sleek new D series plastic cabinet – a triumph of ergonomics and up to the minute design. Within it is the CUB 653 MEDIUM RESOLUTION colour monitor – the perfect mate for computer users who wish to combine the advantages of brilliant, low cost colour graphics with 80 column processing software.

CUB 653's remarkable depth of colour is enhanced by minimal screen glare, thanks to a super high contrast CRT. Even in well lit environments the 653 (H) × 585 (V) resolution and 0.43mm dot pitch produces 80 column text which is pin-sharp and easy to read. Owners of SHARP, RML 480Z, APPLE Series, WANG and other leading computers needn't feel left out, because CUB 653's compatibility extends to these models and many more.

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All Sanyo Colour Monitors come with a free Monitor Stand

SANYO GREEN MONITORS

DM 8112 12" 18 Mhz Hi Res	£86 + VAT £99
DM 9112 12" 18 Mhz Hi Res with tilt stand	£99 + VAT £144

PHILIPS

7001 High Resolution Green Screen with sound input	£69 + VAT £79

MICROVITEC CUB

1431 MS 14" RGB Standard Resolution Colour	£199 + VAT £229
1451 MS 14" RGB Medium Resolution Colour	£249 + VAT £286
1441 MS 14" RGB High Resolution Colour	£399 + VAT £459

CONSUMABLES:

3M Diskettes:	48TPI SS DD Diskettes (Box of 10)	£15 + VAT £17.25
	48TPI DS DD Diskettes (Box of 10)	£18 + VAT £21.00
	96TPI DS DD Diskettes (Box of 10)	£25 + VAT £29.00
Ribbons:	Epson MX/RX/FX 80	£6 + VAT £6.90
	Epson MX/RX/FX 100	£8 + VAT £9.20
	Seikosha GP 100	£4 + VAT £4.60
	Star Gemini 10X	£5 + VAT £5.75
	Shinwa CP 80	£6 + VAT £6.90
	Juki 6100	£2 + VAT £2.30
Daisy Wheels:	Juki	£13 + VAT £14.95
	Brother	£13 + VAT £14.95
Paper:	200 Sheets Draft Quality	£14 + VAT £16.10
	200 Sheets Letter Quality A4	£15 + VAT £17.25

ACCESSORIES:

Leads:	Phono to Phono	£3 + VAT £3.45
	BNC to Phono	£3 + VAT £3.45
	7 Pin to 3 Jack	£3 + VAT £3.45
	7 Pin to 5 Pin (+ remote)	£3 + VAT £3.45
	7 Pin to 7 Pin	£3 + VAT £3.45
	Std UHF Lead	£3 + VAT £3.45
	Sanyo Monitor Lead RGB	£10 + VAT £11.50
	Microvitec Mon Lead RGB	£5 + VAT £5.75
	BBC Centronics Print Lead	£10 + VAT £11.50

A large selection of printer and disc drive leads are held in stock and can be quoted for upon request.

AKHTER

AKHTER INSTRUMENTS LTD T/A
AKHTER COMPUTER GROUP
28/29 BURNT MILL
HARLOW
ESSEX
CM20 2HU

Access VISA

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CALLERS WELCOME AMPLE PARKING

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AKHTER FOR ACORN

Acorn products and fully compatible peripherals

An Official BBC Computer Distributor **An Official Econet Service Centre**

DEALER ENQUIRIES WELCOME

ACORN PRODUCTS

BBC MODEL B including £50 of software	£299 + VAT	£344
with disc interface	£346 + VAT	£398
with econet interface	£349 + VAT	£402
with disc + econet interface	£365 + VAT	£420
6502 Second Processor	£173 + VAT	£199
Z80 Second Processor	£346 + VAT	£398
Acorn Electron including £50 of software	£112 + VAT	£129
Acorn Electron Plus 1 Interface	£52 + VAT	£60
Acorn Electron Plus 3 Interface	£200 + VAT	£230
Acorn Electron Data Recorder	£34 + VAT	£39
Me and My Micro Pack	£159 + VAT	£183
Acorn Bitstick	£328 + VAT	£377
Acorn Bitstick Multi-Plotter Driver	£69 + VAT	£79
Acorn IEEE Interface	£284 + VAT	£327
BBC Prestel Receiver	£121 + VAT	£139
BBC Teletext Receiver	£196 + VAT	£225
BBC Cassette Recorder + Lead	£30 + VAT	£35
A to B Upgrade Kit (inc. fitting)	£113 + VAT	£130
Disc Interface (inc. fitting)	£85 + VAT	£98
DNFS Rom	£18 + VAT	£21
Games Paddles	£17 + VAT	£20
Utilities Manual 40 or 80 Track	£30	
Speech Upgrade	£48 + VAT	£55

ECONET PARTS

Starter Kit	£86 + VAT	£99
Socket Kit	£26 + VAT	£30
10 Station Lead Set	£25 + VAT	£29
Winchester File Server inc 10 MByte Winchester	£1478 + VAT	£1700
Winchester File Server inc 30 MByte Winchester	£2174 + VAT	£2500
File Server Level 2: 80 Track	£217 + VAT	£250
Printer Server Eprom	£43 + VAT	£50
Econet User Guide	£5	

SOFTWARE

ISO-PASCAL (BBC)	£60 + VAT	£69
Wordwise	£35 + VAT	£41
Wordwise Plus	£51 + VAT	£59
View	£52 + VAT	£60
Viewsheet	£52 + VAT	£60
Electron View	£39 + VAT	£45
Electron Viewsheet	£39 + VAT	£45

ACCESSORIES For The BBC

AMX Mouse	£75 + VAT	£87
Tracker Ball	£52 + VAT	£60
Grafpad	£120 + VAT	£138
Intelligent Printer Sharer/Buffer	£120 + VAT	£282

TORCH PRODUCTS

Z80 Disc Pack	£346 + VAT	£398
ZEP 100 2nd Processor + Software	£299 + VAT	£344

100% ACORN COMPATIBLE 5 1/4" DISC DRIVES

MD100A	Single Drive 100k 40 Track Single Sided	£86 + VAT	£99
MD100B	Single Drive 100k 40 Track Single Sided + PSU	£112 + VAT	£129
MD200A	Single Drive 200k 40 Track Double Sided	£112 + VAT	£129
MD200B	Single Drive 200k 40 Track Double Sided + PSU	£138 + VAT	£159
MD202C	Dual Drive 200k (2x100k) 40 Track Single Sided	£164 + VAT	£189
MD202D	Dual Drive 200k (2x100k) 40 T SS + PSU + Monitor Stand	£216 + VAT	£249
MD202E	Dual Drive 200k (2x100k) 40 T SS + PSU + Metal Case	£208 + VAT	£239
MD400A	Single Drive 400k 40/80 T switchable Double Sided	£130 + VAT	£149
MD400B	Single Drive 400k 40/80 T switchable D/Sided + PSU	£156 + VAT	£179
MD402C	Dual Drive 400k (2x200k) 40 T D/Sided	£217 + VAT	£249
MD402D	Dual Drive 400k (2x200k) 40 T D/Sided + PSU + Monitor Stand	£269 + VAT	£309
MD402E	Dual Drive 400k (2x200k) 40 T D/Sided + PSU + Metal Case	£260 + VAT	£299
MD802C	Dual Drive 800k (2x400k) 40/80 switchable D/Sided	£251 + VAT	£289
MD802D	Dual Drive 800k (2x400k) 40/80 switchable D/Sided + PSU + Monitor Stand	£303 + VAT	£349
MD802E	Dual Drive 800k (2x400k) 40/80 switchable D/Sided + PSU + Metal Case	£295 + VAT	£339

Utilities Included Are:

DISASSEMBLER ⋆ DUP ⋆ FORMAT ⋆ FREE ⋆ MDUMP ⋆
MERGE ⋆ RELOCATE ⋆ SDUMP ⋆ VERIFY ⋆ MENU ⋆

3M DISKETTES:

48TPI SS DD Diskettes (Box of 10)	£15 + VAT	£17.25
48TPI DS DD Diskettes (Box of 10)	£18 + VAT	£21.00
96TPI DS DD Diskettes (Box of 10)	£25 + VAT	£29.00

The Akhter Gold Standard

Due to the high standard of the Akhter Disc Drives we have taken the unique step of introducing "The Gold Standard" a TWO YEAR warranty on each and every one of our drives sold after April 1st 1985. To qualify for this 24 month guarantee the lucky purchaser merely returns his individual registration card included in every box to Akhter. Buy your drives with confidence . . . . . . BUY AKHTER!

"An all in package then, which should reliably bring you into the rapidly growing fold of BBC disc system users" A+B Computing Feb '85.

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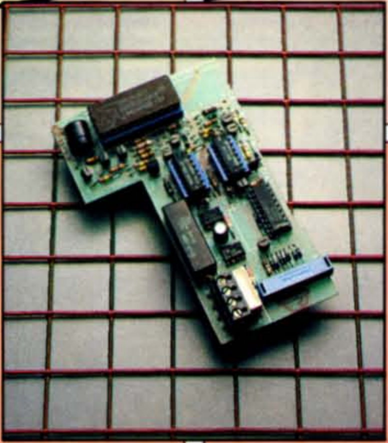


NEWS RELEASE

OBBS Bulletin board software

Now, with OBBS and the Nightingale modem fitted with auto-answer accessory board, you can run your own bulletin board on a BBC micro. The entry level system includes many features normally only found on systems costing ten times as much. Full message searching and XMODEM uploading and downloading of software are provided along with unique colour teletext graphics and text facility. **£21.74 plus VAT**

COMMSTAR Nominated for the 1985 British Microcomputing award, Commstar is an outstanding piece of software. With it's powerful combination of Viewdata and ASCII terminal capabilities, Commstar is probably the only communications software you will ever need.

Developed specially for the BBC in an 8K eprom, Commstar once fitted, is always ready to use. Although it is unusually versatile Commstar is also very easy to use. Full advantage is made of the BBC's function keys and a comprehensive manual describes each of Commstar's features in simple terms. In addition to preprogrammed functions, items such as logon strings and passwords can be placed under the function keys to facilitate automatic access to the vast range of services which are available. When used in conjunction with the Nightingale modem or other multi-standard modems, Commstar opens up a host of possibilities. Did you know that you could access your bank account from your own home or search British Lending Library's records through their on-line system, BLAISE. Accessing Prestel for the latest news or downloading telesoftware from Micronet is just the beginning. . . .

NIGHTINGALE ACCESSORY BOARD This new accessory for Nightingale offers three new facilities on a single card. The auto-dialler now means that you can dial any number without using the telephone. Software designed for use with Commstar will dial a specified number or sequence of numbers once or more until a connection is established, each call being optionally monitored through a loud speaker. Any number of directories can be created and for each telephone number in a directory you may specify a series of attributes which allow Commstar to configure itself automatically for that particular system. Nothing could be easier. Any baud rate may be configured under software control including two new operating speeds 1200 and 600 half duplex which were not previously available. Finally, if you hope to set up your own database or bulletin board, the accessory board includes auto-answering.
Nightingale and accessory board, a complete solution.

Nightingale modem £119, Accessory board £49, Commstar £29.57,
Commstar dialling software available on disc for £10 plus VAT
Commstar & Nightingale Combination £139
All prices exclude VAT. Payment accepted by Cheque, Visa or Access.

For further details about Pace communications products contact your local dealer or call:
Pace Micro Technology
92 New Cross Street
Bradford BD5 8BS
Telephone 0274 729306
Telex 51564
Overseas orders and dealer enquiries welcome.
International tel. no.
+44 274 729306

Prestel is a registered trademark of British Telecommunications Plc.
Pace Micro Technology, a division of Pace Software Supplies Ltd.

TECHNOMATIC

JUNE '85

BBC Computer & Econet Referral Centre
17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

Please add carriage: (a) £8; (b) £2.50; (c) £1.50; (d) £1 and 15% VAT to order value

24 hour service 01-450 9764

ACORN COMPUTER SYSTEMS

BBC Model B	£299(a)
BBC Model B + DFS	£346(a)
BBC Model B + Econet	£335(a)
BBC Model B + Econet + DFS	£399(a)
ACORN 10Mbyte Hard Disc	£1300(a)
BBC Dust Cover	£4(d)
BBC Carrying Case	£12(b)

UPGRADE KITS

A to B	£55 (d)	1.2 O/S Rom	£7.50 (d)
Acorn DFS Kit	£89 (d)	DNFS Rom	£17.50 (d)
Econet Kit	£55 (d)	4816AP RAM	£1.50 (d)
Basic II Rom with User Guide	£22.50 (d)		
1.2 O/S Rom	£7.50	DNFS Rom	£17.50
4816AP Memory upgrade RAM (each)	£2.00		

TECHNO-LINE IS NOW ON-LINE! Tel: 01-450 9764

The response received on the TECHNOLINE over the past few weeks has been tremendous. We are therefore pleased to announce that the TECHNOLINE service will be available for 24 hours a day, seven days a week from 15th May. The pages available include:

***New Products *Comment Box**
***Technical Pages *Comments on Stock and availability of Products**
***Placing of Orders and many others. . . .**

Techno-Line 01-450 9764
24 hour, 7 days a week.

Technical Information: Automatic V21/V23 for both 300/300 and 1200/75 Baud. Standard Viewdata/Prestel Protocols.
Please note that a 'Prestel' type terminal must be used.

ECONET ACCESSORIES

Econet Starter Kit	£85 (b)	Printer Server Rom	£41 (d)
File Server Level I	£75 (d)	10 Station Lead Set	£26 (c)
File Server Level II	£210 (d)	Adv. Econet User Guide	£10 (d)

ACORN BITSTICK

The renowned 'BITSTICK' graphic CAD package. Using the on-screen menu and colour pallette, it can draw freehand as well as lines and shapes with great accuracy. Any part of a drawing may be magnified many times, and up to 48 drawings may be saved on a disc. In total, a friendly yet sophisticated CAD system offering tremendous value. £325(a)

ACORN's multiplotter driver for Bitstick graphics. £79(c)
(All popular plotters included)
Epson FX80 screen dump routine for Bit Stick. £35 (d)

ACORN WINCHESTER DRIVES

Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1 Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III can be installed on the Hard Disc before delivery.

10 Mbyte Winchester Drive £1300 (a)
30 Mbyte Winchester Drive £1999 (a)
Add £200 to the cost if File Server Level III is to be installed.

ACORN Z80 2nd Processor

This processor converts your BBC into a CP/M based business micro providing it with computing power a professional would need. The free software package supplied includes three office productivity programs (word processor, spreadsheet and a database), NUCLEUS report generator, a business program ACCOUNTANT plus three programming languages and comprehensive manuals. All for only £348 (a)

See our section on CP/M software for other packages available for use with this processor.

ACORN 6502 2nd Processor

This processor is designed for the serious computer user who wants to get even more out of his micro. It increases memory by upto 44K for BASIC programs and upto 60K for assy. lang. programs regardless of the screen mode (Ideal for VIEW and WW+). Programs run upto 50% faster. This combination offers computing power of systems costing twice as much. £175 (a)

ACORN P-SYSTEM

The long-awaited-for portable operating system has arrived. Intended for use with the 6502 Second processor, this portable operating system is a complete implementation and comes complete with a Filer, Editor, and compilers for two languages, USCD PASCAL and FORTRAN-77. Widely used in universities and colleges, as well as being popular with business software authors, P-System is user-friendly, offering ease of program development as well as portability. £263(b)

TORCH GRADUATE SYSTEM

The ultimate upgrade — converts your BBC into a powerful 16 Bit business computer and makes it disc and hardware compatible with the IBM PC. With 256K RAM and single/dual drives, it simply connects through the 1MHz bus. (The disc drives can be used in both BBC and IBM mode, without requiring a disc interface.) The top-of-the-range Model G800/2 comes complete with the free Xchange range of software, and includes a full-feature word processor, a financial planner, a database and a business graphics package — all 'linkable'.

(This highly acclaimed software is now available for the IBM PC at a cost of over £400!)

G800/2: £999(a)

OTHER TORCH PRODUCTS

Z80 Card ZEP100 with PERFECT Software Packages + Z80 Basic	£275.(a)
Z80 Disc Pack ZDP240 with software as above	£599 (a)
20Mb Hard Disc + 1 × 400K Floppy Drive	£1,950 (a)
Unicorn 68000, Unix OS/Z80B/512K, 20MB Hard Disc, 400K Floppy	£3495 (a)

TECHTEL 'IN-HOUSE' INFORMATION CENTRE

NEW

A unique concept that allows you to provide information in public places. A member of the public is able, without assistance, to view information about your products or services.

Techtel is a complete package allowing you, in conjunction with a BBC and disc drive, to set up an in-house 'Viewdata' type information system. The friendly software package will allow you to set up a 'Prestel' type database of up to 700 pages, (depending on drive) containing both graphics and text. This menu-driven database could hold details of products or services supplied by your company. Typical user would be any company needing to pass information to the public e.g. banks, dept. stores, hotels, travel & estate agents etc. etc.

The package also includes a 'carousel' type display, allowing each frame to be displayed for a specified time, before moving on to the next frame.

A unique facility of Techtel is its 'through-glass' keyboard. Its special numeric keyboard can be placed inside a shop window, yet may be used by customers outside — thus allowing the unit to be left unattended.

The package includes the special keypad, Teletext Loader and Editor, and full instructions. £175(b)

PRINTERS

ALL PRINTERS HAVE A 12 MONTH GUARANTEE

DOT MATRIX

KAGA TAXAN:

- Epson Compatible Control codes
- 80 or 156 Column
- NEAR LETTER QUALITY Print using 23 x 18 matrix
- Text Modes include Normal, Italic, Enlarged, Condensed, Super/Sub Script, Proportional
- Dot Addressable graphics in various modes
- 3K buffer which can also hold user defined characters
- Extra ROM/RAM socket for custom print fonts
- Friction & Tractor feed with built in paper roll holder

KP810 (80 column) £255 (a) KP910 (156 column) £349 (a)

EPSON:

The industry standard printer offering the quality, reliability and versatility.

RX80T £210 (a) RX80FT £220 (a) RX100 £345 (a)

FX80 £315 (a) FX100 £430 (a)

EPSON JX-80 Full Colour Printer £525(a)

BUFFALO 32K Buffer for EPSON PRINTERS

This compact 32K buffer can be fitted internally on any EPSON printer within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions. £99(d)

DAISY WHEEL

BROTHER HR15: • 14 cps • 3K Buffer • Two colour printing • Proportional spacing • Underline • • Bold • Shadow print • Super/Sub script + many other features.

BROTHER HR15 £325(a)

JUKI 6100: • 15 cps • 2K Buffer • Switchable 10/12/15 cpi • Proportional printing • Linear Motor for max reliability.

JUKI 6100 £325(a)

VIEW & VIEWSHEET PRINTER DRIVER GENERATOR

Gone are the days when you had to buy a dedicated printer driver. This printer driver comes with some predefined drivers and lets you generate a driver for any BBC compatible printer. The screen driver program supplied with it lets you view the text, as it is going to appear on the paper including the bold, italics, underlined characters etc. Supplied on disc. £10(d)

GRAPHICS PLOTTER/WORK STATION

Equally at home in the artists studio, hobbyists workshop, science lab or a classroom, this system has something to offer for everyone. The 3 colour graphics plotter provides both precision and versatility. The carriage can be moved with an accuracy of 0.025cm over an A4 area — the plotter being able to accept paper and far thicker materials at sizes of up to A3. The basic plotter carries 3 colour pens each of which is software selectable. Additional accessories greatly enhance the versatility of the unit without losing the accuracy. The servo controlled drill/router, and scriber can be used on various materials. A unique Opto Sensor (using a Hewlett Packard device) turns the plotter into a high-res scanning digitiser to read & store whole diagrams and photographs. Workstation comes complete with all accessories.

Workstation Complete £490(a)

Basic Plotter £270(a)

Opto Sensor £72(c) Drill/Router Attachment £79(c)
Power Supply: PS12V £42(c) PS24V £78(c)
Scandump Utility Disc £14.95 (d)

TECHNOMATIC

All prices exclude VAT

PRINTER ACCESSORIES

EPSON
Paper Roll Holder £17(d) FX80 Tractor Attachment £37(c).
Interfaces: 8143 RS232 £28(c) 8148 RS232 + 2K £57(c)
8132 Apple II £60(c) 8165 IEEE + Cable £65(c)
Serial & Parallel Interfaces with larger buffers available.
Ribbons: RX/FX/MX80 £5.00(d) RX/FX/MX 100 £10(d)
FX80 Dustcover £4.50(d)

KAGA TAXAN: RS 232 Interface + 2K buffer £78(c); Ribbon KP810/910 £6(d)

JUKI: RS232 Interface £65(c) Spare Daisy Wheel £14(d) Ribbon £2.50(d)
Sheet Feeder £182(a) Tractor Feed Attach £129(a)

BROTHER HR15: Sheet Feeder £189(a) **Ribbons Carbon or Nylon** £4.50(d)

BBC Printer Lead: Parallel (42") £7(d) Serial £7(d)
Printer Leads can be supplied to any other length.

Plain Fanfold Paper with extra fine perforation (Clean Edge):
2000 sheets 9.5" x 11" £13(b) 2000 sheets 14.5" x 11" £18.50(b)
Labels per 1000s: Single Row 3½" x 1 7/16" £5.25(d)
Triple Row 2-7/16" x 1 7/16" £5.00(d)

EPSON HI-80 PLOTTER

EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, ellipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer. Detailed leaflet on request. £399 (a)

PRINTER SHARER/BUFFER

A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

TSB 64 Buffer/Sharer £245(a)

BBC Cable Set £30

PERIPHERAL & COMPUTER SHARERS

We now offer an extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

	Parallel	Serial
3 Computers to a Printer	36V36-3 £69(c)	25V25-3 £64(c)
4 Computers to a Printer	36V36-4 £85(c)	25V25-4 £74(c)
2 Computers/2 Printers X-over	36V36-X £69(c)	25V25-X £69(c)
BBC Cable Set 3 to 1 (1m ea.)	£32(c)	£34(c)
BBC Cable Set 4 to 1 (1m ea.)	£39(c)	£41(c)

Computer Sharer:
1 computer to 2 printers fitted with Cable for BBC TCS26 £19.50(c).

GRAFPAD

A low cost graphic tablet offering the performance & durability required by industrial and educational users. It is compact, accurate & reliable; working area 240 x 192mm + menu area. Comes complete with a CAD package. £110(b).
DDX software £99(b).

01-208 1177

Please add carriage: (a) £8; (b) £2.50; (c) £1.50; (d) £1 and VAT at 15% to order. Carriage (a) sent by Datapost

MONITORS

All monitors supplied with BBC lead

MICROVITEC

All 14" monitors now available in plastic or metal cases, please specify your requirement.

14" RGB		with PAL & Audio	
1431 Std Res	£165(a)	1431 AP Std Res	£205(a)
1451 Med Res	£240(a)	1451 AP Med Res	£280(a)
1441 Hi Res	£389(a)	These monitors can receive TV programs thru a Video Recorder	

20" RGB with PAL & Audio

2030CS Std Res	£380(a)	2040CS Hi Res	£685(a)

KAGA TAXAN 12" RGB

VISION II Hi Res £225 (a) VISION III Super Hi Res £325 (a)

SANYO CD3125NB 14" RGB Std Res £169 (a)

MONOCHROME MONITORS:

SANYO DM8112CX Hi Res 12" Green Screen	£90(a)
KAGA KX1201G Hi Res 12" Etched Green Screen	£99(a)
KAGA KX1202A Hi Res 12" Etched Amber Screen	£105(a)
PHILIPS DGD Hi Res Green Screen	£75(a)
ZENITH 122 Hi Res 12" Amber Screen	£68(a)
Swivel Base for Kaga Monochrome fitted with Digital Clock	£21(c)
Monitor Plinth for the BBC	£13.50(b)
Double Tier Plinth for BBC and flat pack dual drive	£19.50(b)

BBC Leads Kaga RGB £5(d) Microvitec £3.50(d) Monochrome £3.50(d)

RB2 TRACKER BALL

Marconi with its years of experience making tracker balls for use in Military and Air Traffic Control have developed a quality device for the serious hobbyist, for educational uses, and for low cost CAD/CAM applications. RB2 is a compact, ergonomically designed tracker ball that provides precise positional control and rapid direction changing using a freely rotating resin ball in any direction without the limiting stops or the zero point drift of joystick controls. Three switch buttons enable easy software manipulation to incporate the use of the tracker ball. Appropriate software will enable the RB2 to take over the functions of cursor keys in word processing, CAD/CAM applications and two dimensional positional controls of robots, drillheads etc. RB2 which plugs into the user port is supplied with utility programme to use it as a joystick with other software, a comprehensive graphics/CAD program and a program demonstrating its editing capabilities. User guide includes instructions on writing your own programs for the RB2. £52(b)

AMX MOUSE

In conjunction with a controlling ROM this sophisticated mouse has many advanced features such as Icons, Windows etc., these can be used in ordinary programs as well as sophisticated CAD Design. The supplied 'AMX ART' is a superb, yet simple-to-use CAD package allowing the creation of amazing graphical designs. A screendump for drawings is included. It can also be used with Wordwise/View to replace the cursor keys. Supplied complete with CAD Package, ROM and full instruction manual. £69(b)

DISC DRIVES

TECHNOMATIC drives are fitted with high quality slimline Mitsubishi mechanisms and represent the state of the art in drive technology. The drives are built to the highest standards and are tested to their full performance capability before packaging.

All drives are available with or without integral mains power supply. The dual drive power supplies are switch mode type and are generously rated to ensure minimum heat generation even over long periods of operation. All drives with integral power supply are fitted with a mains indicator.

The drives are housed in attractively designed metal casings painted in hard wearing BBC matching paint. The dual drives can be supplied in stacked version or with built-in plinths. The plinth version cases are of sturdy construction to carry any monitor and provide a simple method of having a compact computer installation.

The 80T drives are supplied with the 40/80 track switching modules at no extra charge. The 40/80 track switches are conveniently positioned to enable easy switching between the tracks.

All drives are supplied with all the necessary cables, manual and a formatting disc. The mains powered drives are also fitted with a 13A mains plug suitably fused. The drives are ready to be fitted to the computer. All drives are capable of operating in single or double density modes.

Single Drives:				
1 × 100K 40T SS	TS100	£85(b)	PS100 with psu	£125(b)
1 × 400K 80/40T DS	TS400	£125(b)	PS400 with psu	£149(b)
Dual Drives:				
Stacked Version:				
2 × 100K 40T SS	TD200	£175(a)	PD200 with psu	£200(a)
2 × 400K 80/40 DS	TD800	£250(a)	PD800 with psu	£290(a)
Plinth Version:				
2 × 100K 40T SS	TD200P	£195(a)	PD200P with psu	£220(a)
2 × 400K 80T DS	TD800P	£265(a)	PD800P with psu	£305(a)

DISC DRIVE MULTIPLEXER

A simple device that enables up to four computers to be connected to one single or dual drive. Ideal unit for installing in classrooms where networking is not planned or necessary or the costs have to be kept low or where software information is shared. Several of these units can be installed in series to connect more computers to access the same discs. Units supplied with 5' of cable per outlet as standard. Mains powered.

TDM 4 Quad Unit (upto 4 computers) £135(a)
TDM 2 Dual Unit (2 computers) £75(b)

Note: All computers must be fitted with a DFS

3M FLOPPY DISCS

Authorised Distributor
Data Recording Products

3M

Industry standard high quality discs with guaranteed error free performance for life.

Discs in packs of 10:

40T SSDD **£13(c)**	40T DSDD **£18(c)**
80T SSDD **£22(c)**	80T DSDD **£24(c)**

FLOPPICLENE DRIVEHEAD CLEANING KIT

The FLOPPICLENE drive head cleaning kit is an ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminates the risk of contamination and abrasion of sensitive driveheads. These risks are normally inherent in the reusable drivehead cleaning kits. Floppiclene with 20 disposable cleaning kits. £14.50(b)

DISC ACCESSORIES

Single Disc Cable £6(d) Dual Disc Cable £8.50(d)
10 Disc Library Case £1.80(d) 30 Disc Case £6.00(c)
Lockable Storage Boxes 40 Discs £14(c) 100 Discs £19(c)

COMMUNICATIONS

MODEMS

ACORN PRESTEL: The official Acorn add-on — an advanced BT Approved. Auto-Dial, Prestel Terminal ideal for British Telecom Gold. Comprehensive software includes 'tagged' frames, downloading of Telesoftware, saving of frames, printing, sophisticated 'Mailbox' handling c/w editor. A built-in speaker allows line monitoring. A simple !BOOT file allows automatic operation £99(b)

BUZZ BOX **A full spec, BT approved, pocket size, direct connect modem with both originate & answer modes, full & half duplex, allowing access to many databases, bulletin-boards as well as Intercomputer communications. It conforms to CCITT V21 300/300** Baud Standard. Battery/mains powered £62(c) BBC Lead £6 External PSU £9(c)

MINOR MIRACLES WS2000 A world standard modem, having BT approval, covering V21,V23,BELL 103/113/108 and including 75,300,600,1200 Baud ratings. (It even includes 'reverse Prestel'!). This is the modem that will cover 'Prestel' type systems as well as Bulletin Boards both in the UK and abroad. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto-dial/auto-answer makes this modem unique. WS2000 £129(c) BBC Serial Cable £7

POWER
Tx DATA
Rx DATA
CARRIER
ON LINE
LOCAL TEST

WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line £30(d).

BBC User Port cable (for modem control) £7.

SKI KIT (Allowing total control of the modem by your computer) £10.

DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers for autodialling £10.

WS2000 Auto-Answer Card £30(d).

(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

DEMON A High Performance, yet low-cost Modem. Features include: Auto-dial & auto-answer, Auto baud rate scan, 75,300,1200 Baud rates with V21, V23 and Bell standards. Sophisticated software in ROM allow many features like: Auto-Dial. Redial, Remote facilities etc. An Auto-Dial disc allows storage of commonly dialled numbers. UNICOM £49.95(b) Unicom ROM £20 Unicom Disc £9.95 Unicom Cable £6(d) Not BT approved

COMMSTAR An ideal communications Rom. Extremely easy to use, yet very versatile. It features both a Prestel mode as well as a Terminal mode, thus offering very good value for money. In Prestel mode, all normal Prestel features are available including, downloading of software, saving and retrieving of pages on disc, page tag, revealing of hidden text etc. Its terminal mode is ideal for bulletin boards etc. All input may be copied into a buffer in memory over which full control is available. Controls of protocols are very simple and any type of file, (not just ASCII) may be sent using XModem protocols. Even includes an elapsed time-clock. £29(d)

TERMI-II A good all round package for communicating with notice boards, electronic mail services etc. Termi is a semi-intelligent terminal emulator allowing the BBC to act as a dumb terminal, slave BBC graphics terminal, or VT52 terminal. The rates at which data is sent or received is easily set up with rates of up to 4800 Baud with 40/80 col. selectable. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Termi is not suitable for PRESTEL). £28(d)

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). £59(d).

SMARTMOUTH

The original 'infinite speech' synthesiser. A ready built, self contained speech synthesiser unit attractively packaged with a built in speaker. Plugs into the user port. £24(c)

TECHNOMATIC

All prices exclude VAT

EPROMER II

EPROMER II
TECHNOMATIC LTD

A sophisticated eprom programmer that handles the full range of single rail eproms (incl 27256) and allows the user full control of the programming process.

Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

- Integral power supply ensures no power drain from the computer.
- Interfaces through 1 MHz bus, fully buffered and complies with the Acorn protocols.
- Eproms upto 16K (27128) programmed in single pass.
- Selectable programming voltage 25/21/12.5V
- Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses FF data to increase programming speed. Automatic verification on completion of programming.
- User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
- Full screen editor with HEX/ASCII input.
- Full tape/disc filing facility. Data input from keyboard/Tape/Disc/Eprom.
- Constant display of all options selected.
- Several BBC BASIC programs can be entered on a single eprom.

EPROMER II with Manual & Cassette £99(b) Software on disc £3 ROM based software £10

ATPL SIDEWISE ROM EXPANSION BOARD

This is a well constructed expansion board, that does not require soldering in its installation. All buses are buffered. It allows full sideways Rom expansion to a total of 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K byte CMOS RAM chips, giving a total of 16K sideways RAM. This is ideal for sideways rom development, and will also allow downloading of software from cassette or disc. The battery backup option will allow retention of data in the RAM, when power to the computer is removed. Several link-selectable options include the choice of type of Eprom, and a 'write-protect' for the RAM option. £39(d) Back-up Kit £18.

UV ERASERS

UVT1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. £59(b).

UV1T as above but without the timer. £47(b).

'TIME-WARP' REAL-TIME CLOCK CALENDER

We have broken the price barrier! A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as Extensive software on cassette (easily transferred to disc) — no ROMs needed. £29(c)

time-warp
real-time clock
TECHNOMATIC

RAMROM-15

The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. (Allows other units to be fitted inside the BBC). Absolutely no soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. All the hardware to take the RAM is already fitted e.g. battery backup. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. £112(b)

01-208 1177

Please add carriage: (a) £8; (b) £2.50; (c) £1.50; (d) £1 and VAT at 15% to order. Carriage (a) sent by Datapost

TECHNOLINE

TECHNOLINE is a VIEWDATA system we have set up to enable our customers to get up-to-date information and prices on our products at any time of the day or night. It also allows the viewer to send correspondence and orders to us at any convenient time. Needless to say, using this 'latest technology', enables us to yet further improve on our fast response to customer requirements.

THE SCROLL

We are about to launch a revolutionary new concept in Word Processing, that will raise the standard of BBC word processors.

Among its revolutionary features are:

1. A supplied 64K ram card allows a genuine 64K of text storage.
2. 40/80 Column use is easily selectable.
3. A special non-volatile 2K ram, stores (even when the BBC is switched off!) both pre-defined document configurations, and pre-defined printer drivers. This allows you to take full advantage of many and varying printer facilities, such as Italics, Bold, Underline, Shadow etc., with ease and simplicity.
4. A unique facility allows user access to the 64K Ram and 2K Non-volatile RAM.

Not priced for the lower end of the market, this product is aimed primarily at the professional user who spends a considerable period of time using a word processor, and is not satisfied with 'hobby' type products. We feel that we have reached a high standard with this product — that it has achieved the delicate balance between sophisticated features and an elegant ease of use.

Detailed specifications to be released soon.

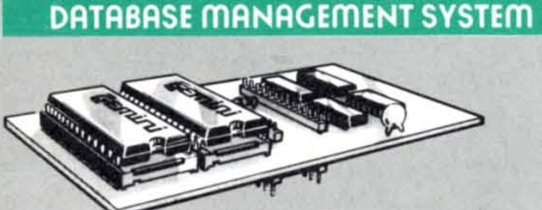
ACORN IEEE INTERFACE

This interfaces enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £282(a)

ACORN MUSIC 500

Convert your BBC micro into a sophisticated music composition aid and sound effects generator. Custom made software will provide you with the flexibility to compose, experiment, perform and teach music. Stereo output can be connected to a sound system including your home stereo unit. Full specification on request. £174(a)

DATABASE MANAGEMENT SYSTEM



Gemini DATAGEM

The Definitive Random Access, 24K ROM Based DATABASE MANAGEMENT SYSTEM.
Datagem is the first truly flexible database for the BBC Micro that can make your system really useful and efficient, saving you money in the long run. The system includes a carrier board containing two Eproms, demonstration applications disc in both 40/80T, professional documentation with quick reference card, and 'Trans' utility program. Features include: *almost unlimited file size (max 10MByte) *supports up to 4 drives *Max of 5000 records per file *max 6K record size *max of 62 fields *9 level hierarchical search system with facilities to store results of searches. Searches can be any one of the following: Search, Include, Exclude, Combine, Common or Difference *user defined variables *generates form letters from records. Please ask for leaflet. £112(c).

STARdataBASE A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. Its printer configuration suits any BBC compatible printer. £75(d)

ROMs/SOFTWARE

VIEW Acorn's new version V2.1 word processor rom. Advantages include printing straight from memory and editing in any mode. £48(c)

HI VIEW Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. £52(c)

VIEW INDEX Disc based program to create an index from VIEW text files. Ideal for anyone concerned with writing extensive reports or books. £13(d)

WORDWISE One of the most popular word processors for general use **£34(d).** Wordwise SpellCheck Disc — A must for any serious word processor user. Normal price **£16.50(d).** If bought with Wordwise: No p&p and only £14.

WORDWISE PLUS The new advanced Wordwise on a 16K eprom, for the more specialised users who require added features and flexibility. New facilities include: 2nd Processor compatible allowing 80 column previewing in all cases, a new Basic-like language, new editing features and embedded commands etc etc. Four new programs are also supplied allowing mail-merging, index generating, two-column text printout and continuous processing. A new 56 page introductory manual and a 180 page reference manual complete this rather special package. Finally, it is able to use existing Wordwise files without any modification. £49(d).

SPELLCHECK II: A rom based fast machine code program that works with both VIEW and WORDWISE. Vocabulary disc supplied with 6000 words can be expanded to well over 17000 words on 100K drive. Fully compatible with 6502 second processor. £26(d)

ISO-PASCAL: Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. £60(c)

ACORN LOGO A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. £60(b)

ULTRACALC 2 This enhanced version of the original BBC Publications popular spreadsheet rom includes many new features including full compatability with the 6502 2nd processor running as HiCalc allowing 44K of user memory, operate in any mode, greater flexibility in printer control, spooling as ASCII file etc. All these features are in addition to the existing powerful features such as handling of labels and numbers as values. Column width control and features normality found in well designed spreadsheets. £69(d)

VIEWSHEET Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be rearranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. £52(d)

BCPL A full implementation of the BCPL compiler language consisting of the language rom, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. BCPL can be used to develop games programs, commercial packages, system software, to write control systems and to produce programs which otherwise would need to be written in assembler. £52(b)

BCPL STAND ALONE GENERATOR Utilities in this package enable the programs developed using the BCPL rom to be converted so that they can be run on any BBC micro whether it has a BCPL rom or not. Stand alone programs for other 6502 based systems can also be developed. £43(d)

BCPL CALCULATIONS PACKAGE: supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calculation files, example files and a comprehensive user guide. £17.30(b)

ACORN LISP Rom	£43(d)
ACORN FORTH Rom	£43(d)

G:FORTH An advanced implementation of FORTH which follows the 79-Standard specification on a 16K ROM and has a full double number extension set. It incorporates an editor, 6502 assembler, very fast turtle graphics and supports extensive string and file handling. It contains 540 predefined words including those for reading joystick ports, produce sounds, set and read the time and produce random numbers. Fully compatible with disc or tape filing systems and works in any mode. Package comes complete with a USER GUIDE, Introduction to FORTH and 16K GFORTH ROM £43(d)

DISC DOCTOR Computer Concept's popular disc utility rom which adds 20 commands to the DFS system. £27(d)

EPROMs/RAMs

2764-25	£4.00(d)
27128-25	£7.50(d)
6264-15	£7.50(d)
6264LP-15	£8.00(d)

DISCMASTER Beebug's a disc utility which provides additional DFS commands and utilities including disc menu to automatically RUN/*RUN programs, converting 40 track discs to 80 track and enable dual catalog. £16(d)

EXMON II Updated version of the EXMON rom with facilities including dual screen operation and full screen memory editor. £24(d)

TOOLKIT This ROM adds 27 new commands to the BBC BASIC. These include a full screen editor, merge, relocating data in memory, program compactor, listing of variables and memory search. £23(d).

SLEUTH A debugging tool for BASIC programs which includes features like single stepping of dual screen programs, and accelerator to run programs from full speed to freeze frames. £24(d)

GRAPHICS ROM ··★·· £27(d)

PRINTMASTER This ROM features the most versatile screen dump for EPSON MX/RX/FX80 and Kaga 810 printers. It supports three types of dumps. The first allows any graphics on the screen to be dumped. Colours appear as shades of grey. Any part of the screen can be printed at any position on the paper in any one of four orientations. The screen dump may be magnified by any factor x2, x3, x4 etc. A special feature allows true MODE 7 screen dumps with TELETEXT text & graphics. The second dump allows any text to be dumped whilst the third dump will print the contents of a file on disc whilst the computer is doing other things. This is not all. All printer functions can be called up using the *command. *DEFINE allows the printer to define his own characters and store them. *GPRINT allows printing of enlarged text in any position, orientation, size & shade. *WINDOW allows windows to be defined in any size and position on the screen. Can allow you to do printing as background operation while the computer does other jobs. **In short this one ROM does it all.** £28(d)

DUMPMASTER Disc based program that produces fast machine code routines for a variety of printers incl. EPSON MX/FX, STAR 910, Seikosha, NEC PC8023, INTEGREX 132A. Dumps in 8 shades in any mode including teletext mode. Snapshot facility allows dumps from games and other programs. £10(d)

MUROM Sound Extension Rom: Helps you create your own tunes and sound sequences either with MUROM's editor and a musical score or using the keyboard to simulate a piano. Edit your creations with the full screen music editor and then switch to envelope editor to tailor the tonal quality and select instrument type. Incorporate the music into other programs or playback with or without MUROM. Instant sound effects can be called from Basic eg *ZAP, *SIREN, *EXPLODE etc. £24(d)

BILLBOARD A useful program that enables your BBC to produce super-large 'Billboard' type characters i.e. a continuous horizontal scrolling of super-large characters. Supplied in ROM. £16.50(d).

HELP Rom based comprehensive on screen HELP facility to aid and speed up programming. £21(d)

MICROGUIDE Keyplate: This keyplate fits neatly over the keyboard and provides ready reference to a comprehensive list of VDU codes, wipe clean pen supplied, it can be used for fn. key identification etc. Spiral bound microguide book contains lots of useful information on keywords, abbreviations, *FX commands and error messages — saves hours thumbing through the manuals and guides. £6.50(d)

MICROTEXT This authoring system developed by the NPL allows production of a wide range of man-computer dialogues. User can draw up a frame made up of text/graphics and combine a series of frames to create modules which are incorporated into a program. An expert in any field can create complete courses of computer based instruction material. Applications include interviewing systems, teaching packages, training courses and interactive demonstrations and simulations. Disc £53(b) Cassette £43(b)

REPLICA II 40 & 80 Track Versions available. £10.35(d)

BROM — the new utility ROM from Clares — a Toolkit ROM that gives you full screen editing. Many extra functions are included. £30(d).

BEEGUG DESIGN £16.50(d)

BEEBUG SUPERPLOT Cass £8.50(d).

CP/M SOFTWARE FOR TORCH Z80 ACORN Z80 PROCESSOR

We can now supply almost any CP/M based software package in a format suitable for the Torch Z80 and Acorn Z80 second processors. The following are generally available from stock.

DBASE II £335(a) **WORDSTAR PROFESSIONAL £380(a)**

WORDSTAR £275(a) **DBASE II Tutorial..... £32(c)**

PROPASCAL £220(a) **Supercalc 2 £200(c)**

Phone for your specific requirements.

Please specify the type of format (TORCH or ACORN) required.

SPELLCHECK I Menu driven spelling checker for Wordwise or VIEW. Dictionary contains 6000 words and is expandable to 1700 on 100K disc. £16.50(d) Disc (80 or 40 Track) Specify whether Wordwise or VIEW.

MASTERFILE II The new version of the popular general purpose file management system. It allows large amounts of information to be stored and processed. It is extremely powerful yet flexible to use. The disc version allows up to 17 fields per record, and the only limitation as to the number of records is the capacity of the disc. Typically, using 5 fields, about 2000 records may be stored on a 100K disc. This latest version features many new facilities including use with WORDWISE/VIEW £16.50(d) Disc (80 or 40T).

HERSHEY CHARACTER font generator: Disc based menu driven package with 1500 new characters made up from 9 different Hershey character fonts. Flexible utility allows choosing of any characters and appending them to users programs. Screen dump routine for Epson printers included. £12.50(d).

When ordering software on disc plese specify track format (40/80)

BOOKS

(No VÅT p&p £1.50 per book)

CPU/Assembly Language Books

6502 Applications	£12.50
6502 Assy Lang Prog	£17.50
6502 M/C for Beginners	£ 5.95
6502 Advanced Programming	£11.95
6502 Programming	£13.95
6800 Prog Reference Manual	£ 9.00
6809 Assy Lang Programming	£13.45
6809 Programming	£12.95
8086 Book	£19.50
Prog. the 8086/89	£13.50
68000 Assy Lang Prog	£18.95

LANGUAGES

CP/M Handbook	£13.95
Mastering the CP/M	£16.50
FORTRAN Cookbook	£ 8.00
Introduction to PASCAL	£16.50
Prog the Micro with PASCAL	£ 8.50
The UNIX Book	£12.50

BBC Micro Books

Books for Beginners:

Let Your BBC Teach U to Prog	£ 2.50
BASIC programming on the BBC — Cryer	£ 5.50
BBC BASIC	£ 5.50
BBC BASIC for Beginners	£ 6.25
BBC Micro for Beginners	£ 6.25
Easy Prog for the BBC Micro	£ 5.00
Friendly Computer Book	£ 3.50
Gateway to Computing BBC1	£ 4.95
Gateway to Computing BBC2	£ 4.95
Getting More from Your BBC & Electron	£ 5.95
Introducing the BBC Micro	£ 4.50
Step by Step Programming 1	£ 5.95
Step by Step Programming 2	£ 5.95

Languages/Programming

30 Hour BASIC	£ 6.75
Advanced User Guide	£12.50
Adv BASIC Rom User Guide	£ 7.50
Advanced M/C Tech for BBC	£ 7.50
Advanced Prog Tech for BBC	£ 8.50
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Assembly Lang Prog for BBC	£ 7.95
Assembly Lang Prog 2nd Ed — Birnbaum	£ 8.75
Applied Assembly Lang on BBC	£ 7.95
BASIC Rom User Guide	£ 9.95
BBC Rom Book B. Smith	£9.95
BBC Micro Revealed	£ 2.00
BCPL User Manual Acorn	£15.00
Beyond BASIC BBC Publ	£10.00
Creative Assembler on BBC	£ 5.95
Century Computer Prog	£ 9.95
Drawing your own BBC progs	£6.95
Discovering BBC M/C	£ 6.00
Guide to the BBC ROM	£ 9.95
Expert Guide James	£ 6.50
Exploiting BBC BASIC	£ 6.95
FORTH Acorn	£ 7.50
Further Programming for BBC	£ 5.50
LISP Acorn	£ 7.50
Programming the BBC	£ 6.50
Structured Programming	£ 6.50
S-PASCAL Acorn	£ 7.50
Using BBC BASIC	£10.00

SOUND & GRAPHICS:

Advanced Graphics with BBC	£ 7.50
BBC Graphics & Sound	£ 7.50
BBC Micro BASIC, Sound & Graphics	£ 7.50
Creative Graphics Acorn	£ 7.50
Graphics on the BBC Micro	£ 6.00
Turtle Graphics	£ 7.50

EDUCATIONAL:

35 Educational Programs	£ 6.00
BBC Micro in Education	£ 6.50
Prog for Education (Pri.Sch)	£ 5.95

DISC DRIVE SYSTEMS:

BBC Micro Disc Companion	£ 7.95
Disc Book	£ 3.50
Disc Programming Techniques	£ 6.95
Disc Systems	£ 6.95
Using Floppy Discs	£ 6.95

APPLICATIONS:

BBC Filing Systems & Databases	£7.95
BBC Software Projects	£ 6.95
Business Programming on BBC	£ 7.95
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Exploring Music with BBC & Electron	£ 9.95
Graphs & Charts Acorn	£ 7.50
Interfacing Projects for BBC	£ 6.95
Making Music on the BBC	£ 5.50

GAMES:

21 Games for the BBC Micro	£ 5.00
100 Programs for the BBC	£ 6.00
Creating Adventure Programs	£ 5.00
Instant Arcade Games	£ 2.95
BBC User Guide Acorn	£15.00

MISCELLANEOUS BOOKS:

6522 VIA Book	£ 4.50
Micronet Handbook	£ 6.95

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(Dollis Hill 2 mins walk, ample car parking space)
West End: 305 Edgware Road, London W2. Tel: 01-723 0233
(Near Edgware Road ⊖)

01-208 1177

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(Minimum telephone order £5)

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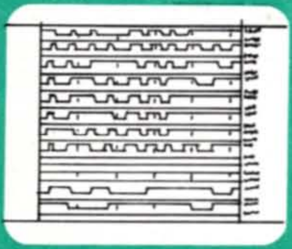
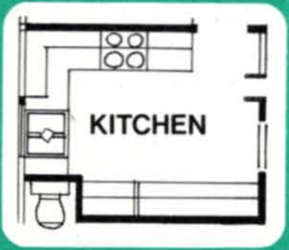
ONLY £79
+ £2 p&p + VAT

NOVACAD

Computer Aided Draughting for the BBC Micro





New from Technomatic – a CAD package with facilities which until now were confined to mainframe or mini computers. But at a price everyone can afford.

Whether you want to design a complex electronic circuit diagram or plan your new kitchen or simply draw a cube NOVACAD will help you do it better and more easily.

All you need is a BBC Micro Model B fitted with an Acorn DFS system and a disc drive.

If you have a 6502 2nd processor and a dual disc drive system then NOVACAD's capabilities are further enhanced.

MAIN FEATURES

- * Very user friendly with all controls and commands from the keyboard.
- * Special windowing techniques make available to the user almost one million dots allowing a lot more details to be put on the drawing that one would normally expect the BBC to be capable of. (Mode 0 screen displays only 1 6 the number of dots). The drawing can be 4 screens across and 5 screens up.
- * Libraries of user defined shapes such as electronic symbols can be created easily and edited even in the middle of drawing another diagram. Even whole sections of diagrams can be defined as shapes.
- * Shapes can be called by name from a library into any part of the diagram and can be moved, enlarged, reduced, rotated in 90° steps and have mirror images made before being finally positioned.
- * A zoom facility allows the user to magnify any section of a drawing by upto 50 times to make it easier to insert details.
- * User definable grid helps the user set his own scaling for the drawings.
- * Upto 8 'levels' can be used to produce multi layer drawings, and then user can decide which levels are to be displayed. This can be particularly useful in pcb drawings, architectural drawings with details of the services behind the walls displayed only when required and many other such applications.
- * Text can be added at any position vertically or horizontally.
- * Powerful delete facilities allow deletion of single lines or whole sections with minimum of key presses.
- * Printer dump for Epson compatible printers incorporated in the software which allows a full or a sectional screen dump.
- * An optional plotter utility will allow output to a range of popular plotters for high quality diagrams.

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LOOK in any BBC computer magazine at the moment and you'll be bombarded by adverts for various Basic toolkit ROMs which aid in the manipulation of Basic programs.

The two ROMs reviewed here are not just another two toolkits, but "dynamic" programming aids. They control the running of the program much like a machine code monitor, allowing it to be run one statement at a time (single stepping), to stop when a certain line has been reached or when a variable has a set value (set breakpoints) and to display current variable values. Thouh they share the same basic idea, they implement it in very different ways.

Sleuth has winning ways with graphics...

Sleuth version 1.05
Beebug

AFTER typing in *SLEUTH a control page is entered (See Figure I), which looks a little different from that seen accompanying Beebugsoft's advertising. All the programming commands are entered from this page.

As you can see, a number of items of information are displayed across the top of the screen. The first group FR GS RP PROC show the number of FOR/NEXT loops, GOSUBs, REPEAT/UNTILs and PROCedures active at the time.

ACC, the "accelerator", refers to the speed at which a program runs (0 the slowest, 100 the fastest).

In the top right corner of the screen are a number of status flags indicating printer active, trace, breakpoint, single step, control/program screens.

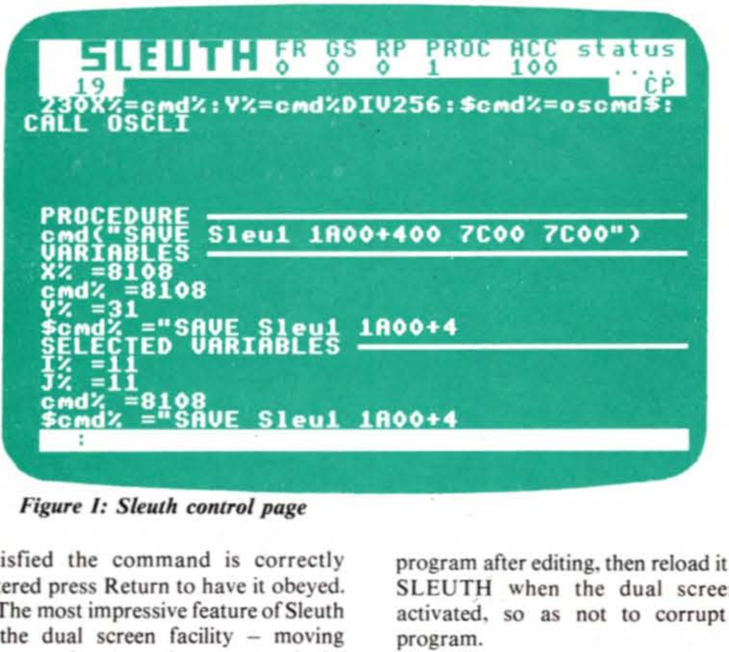
The rest of the screen is divided into five areas. The top one displays the current line. In the single stepping mode each statement is highlighted in a different colour as it is being executed – especially useful with complex conditional statements.

The next section gives the name of the current procedure.

Up to four variables from the current line are then displayed. Below this is an area for showing either the breakpoints or any four variables you want to keep an eye on.

The bottom section is a window where commands are typed in or error messages shown.

The instructions are typed in as one or two letters, which are then "expanded" to give the full name of the command. For example, pressing G results in GOTO being displayed. Once satisfied the command is correctly entered press Return to have it obeyed.



```
   SLEUTH FR GS RP PROC ACC status
          0  0  0  1    100   ....
   19                           CP
230X%=cmd%:Y%=cmd%DIV256:$cmd%=oscmd$:
CALL OSCLI



 PROCEDURE
 cmd("SAVE Sleu1 1A00+400 7C00 7C00")
 VARIABLES
 X% =8108
 cmd% =8108
 Y% =31
 $cmd% ="SAVE Sleu1 1A00+4
 SELECTED VARIABLES
 I% =11
 J% =11
 cmd% =8108
 $cmd% ="SAVE Sleu1 1A00+4
   :
```

Figure I: Sleuth control page

The most impressive feature of Sleuth is the dual screen facility – moving between the control screen and the program screen which may be in any mode. Swapping from one to another is simply by pressing the Tab key.

There is a choice of running the program through at a set speed, single stepping one statement at a time, multistepping through the current loop, through the next loop, or until a breakpoint is reached.

It's also possible to run from a given line rather than from the first line. While running, the program can be stopped at any time by pressing the @ key.

Up to three breakpoints can be set to stop at a given line number or if a given condition is true.

There are however some minor irritations. Having to leave Sleuth to edit program lines is one. It's best to save the program after editing, then reload it into SLEUTH when the dual screen is activated, so as not to corrupt the program.

Single stepping is not as easy to use as it should be. When you set the single step mode it will go to the first line of the program. If you want to start from any other line, it must be at a breakpoint or at the line which was executing when interrupted by pressing @.

You are able to update the value of a variable, but not to assign a value to an undeclared variable in Sleuth – annoying if debugging a section of a long program and you want to assign a value to a global variable.

Documentation is in the form of a 24-page, A5 size pamphlet. It gives a simple and clear account of the commands. Included is a reference section on memory workspace usage and a command summary.

Mike Mahon

```
*HELP

Yorkshire HiTech MICROSCOPE 1.00
  DEBUG
  SUPPORT


*HELP DEBUG

Yorkshire HiTech MICROSCOPE 1.00
  BREAK (<number>) (<line number>)
  DISPLAY (<number>)
  LIMITS (<first>) (<last>)
  MEMORY (<address>)
  OUTPUT (P/<fsp>)
  PAUSE ON/OFF
  PRINT (<var>)...
  ROUTE (L)
  SHOW ON/OFF
  TRACE ON/OFF
  TRAP ON/OFF


*HELP SUPPORT

Yorkshire HiTech MICROSCOPE 1.00
  BUFFER (<address>)
  CLEAR
  CLS
  DATA
  ERASE
  ERL
  EXPAND (<first>) (<last>)
  INSERT
  LISTO (<number>)
  RELOCATE (<address>)
  REMOVE (<first>) (<last>)
  RESET
  SPLIT (<first>) (<last>)
  TIDY
```

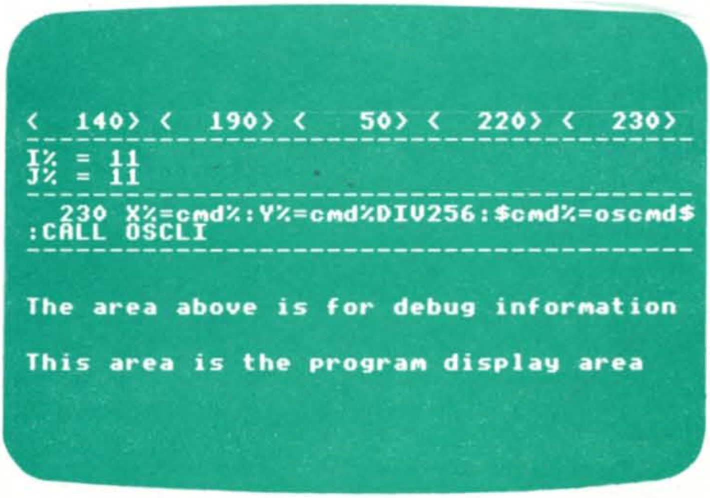
*Figure II: Microscope *HELP display*

...and you'll find Microscope tends to grow on you

Microscope version 1.00
Yorkshire Hi Tech

RATHER than have a separate control screen the commands are entered from Basic like operating system *Commands. They are divided into two groups as shown by the *HELP display (see Figure II).

There are numerous display options that may be selected. You only need to display those that are of interest to you. Figure III gives an idea of how a screen may look if the "line trace" and "show current line" are selected and the current values of I% and J% are printed.



```
<  140> <  190> <   50> <  220> <  230>
----------------------------------------
I% = 11
J% = 11
----------------------------------------
  230 X%=cmd%:Y%=cmd%DIV256:$cmd%=oscmd$
:CALL OSCLI
----------------------------------------


The area above is for debug information

This area is the program display area
```

Figure III: Microscope in action

If debug information is not wanted on the screen it can be directed to printer, disc or tape.

***BREAK:** Lists, sets or clears breakpoints (up to nine at any time).

***DISPLAY:** Display trace line numbers.

***LIMITS:** Instructs the debugger only to show the trace of the lines you are interested in.

***MEMORY:** Displays the values of each byte of a block of memory. This is particularly useful when setting up parameter blocks for machine code calls within Basic.

***OUTPUT:** As Microscope doesn't have dual screens debugging output can be directed to screen, printer, disc or tape.

***PAUSE:** Switch for single stepping.

***PRINT:** Displays user-defined variables and their values. Numbers can be printed in hexadecimal by preceding them with a "~".

***ROUTE:** Displays the line numbers of the last 20 executed lines.

***SHOW:** Switches to display the current line as it is being executed.

***TRACE:** Main switch for the trace mode.

***TRAP:** Displays error message, error line and approximate error position.

As well as the debugging commands there are a number of toolkit type functions and commands to manipulate the control buffer.

***BUFFER:** Moves control buffer to any location in memory.

***CLEAR:** Clears all the resident variables, A%-Z%.

***CLS:** Clears the screen.

***DATA:** Gives the addresses of PAGE, TOP, LOMEM, HIMEM and "top" of variables as well as amounts of memory space used and available.

***ERASE:** Clears the record of the last 20 lines remembered by the trace function.

***ERL:** Lists the line the error occurred on.

***EXPAND:** Formats a listing so that

→

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only one statement appears on each line, to make listing much easier to read.

***INSERT:** Moves the control buffer to the bottom of memory.

***LISTO:** Sets list option settings.

***RELOCATE:** Moves a Basic program down (and up!) in memory.

***REMOVE:** Removes blank lines inserted by *SPLIT.

***RESET:** Clears control buffer if corrupted.

***SPLIT:** Divides up multi-statement lines so that each line only has one statement. (Though there is no combiner to put as many statements on one line as logically possible.)

***TIDY:** Like the Watford DFS, it closes all open files, including any debugging output files.

These commands can also be incorporated into Basic programs. Because of this Microscope has a number of error numbers and messages.

The manual is a 36-page, A5 spiral bound and covers each of the commands simply. There is an index as the commands are grouped according to type of function rather than in alphabetical order.

There is a short but useful section on the types of programming errors that commonly occur.

Conclusions:

Each of these utilities has good points and irritations. In common with most toolkits neither works across the Tube. With the 6502 second processor on Microscope will ignore any command while Sleuth will cause the system to crash.

And, of course, although debuggers will help you identify the problem, they will not make up for lack of planning or programming skills.

So, even with one of these chips, spaghetti programming will still be difficult (if not impossible!) to debug, whereas a well -structured program is always much easier.

Sleuth is not as glossy in use as its advertised image, but the dual screen function is excellent for debugging graphics. Microscope looks rather plain at first sight, but grows on you.

Jim Notman

Print buffer could let you live a little longer

Buffer & Backup ROM
Watford Electronics

THIS 8k eprom, sold at a giveaway price of less than £20, has considerably lengthened my potential lifespan. I now spend very little time grinding my teeth with impatience while watching my BBC Micro print out a document.

The ROM's main use is to support a print buffer based on CMOS RAM contained in the sideways ROM sockets (only for Centronics type parallel printers).

It will support up to 16k, either occupying eight sockets and costing over £30 in 2k chips or occupying two sockets and costing over £60 in 8k aliquots.

On some ROM extension boards there is a split socket so that only one of the 16 ROMs is lost when 8k RAM is used. Of course the RAM is also available for ROM software development.

At switch-on the Watford ROM searches the sideways ROMs and announces "Print buffer in page ** :**** bytes free". It works in both Watford and ATPL ROM expansion boards, but there should be no reason why it will not work on other boards.

On entering *FX5,3 all printing is passed via the buffer so freeing the micro for use as quickly as possible. With a nominal 16k buffer 15.5k is available, allowing approximately nine A4 size pages of text to be accepted by the buffer before the rate of filling is limited by printer speed.

Printing is stopped by holding the Break key down for half a second, and restarted by sending another character to the printer or reselecting printer off and on line. The buffer is emptied by entering *BUFFER or pressing Break with any key other than Shift or Ctrl.

In addition other facilities are available on this chip, some making use of the ROM filing system. Typing *ROM followed by *CAT displays five programs whose information can be expanded by *OPT1,2.

Activating the !BOOT file by pressing Shift, Space and Break together loads a menu of other routines. The first of these enables the user to look at any ROM and is only spoilt by poor layout and uncontrolled scrolling.

Another facility allows transfer of disc programs to tape so that backups for single sided, single drive users are available. Included within this is a routine for creating menus on discs or tapes.

Two further star commands are supported. *VAR displays Basic variables and their values. Arrays are listed with their dimensions but not their contents. *TCOPY allows the copying of tape programs onto tape, Hobbit or disc.

In short this Buffer and Backup ROM is almost a giveaway for users who already have CMOS RAM, but the additional cost of such RAM and the ROM space used may deter other potential purchasers.

Ian Whitmore

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ROM Manager 8k eprom
Watford Electronics

JUST when your sideways ROM board was filling up and ROM commands were getting in each other's way comes this timely arrival from Watford.

ROM Manager prefers to sit in a high priority socket on the BBC Micro or sideways ROM board (don't they all!) in order to provide more control over the other ROMs. The version tested here was 1.00 which, on entering *H.MA., the minimum abbreviation to avoid clashes, revealed its 18 commands.

They are concerned either with providing information about ROMs, controlling the passing of star commands to them or examining memory and using RAM to simulate ROM. In addition, with ROM Manager in place, pressing R+Break informs the user that the ROM filing system has been selected.

Most of the common names are self explanatory. ROMs could be accessed either by their name or by their socket number preceded by a % sign. This numerical option saved a lot of key pressing when using the controller commands from the second group.

I found that from the first group (Information), *NAMES was the most useful and used it before calling *EXAMINE to investigate a ROM. The latter facility allowed the user to scroll through ROM memory in either direction at a reasonable speed.

Similarly *MODIFY was a very useful and easy to operate memory editor for RAM, equivalent to Disc Doctor's *MZAP.

With many ROMs installed in the BBC Micro it is common to find at least two using star commands of the same name. Accessing the lower priority ROM (the one nearer to socket 1) is not directly possible as commands will be intercepted by the higher priority one.

Short of running a little machine code routine, the user often has to resort to removing the offending higher priority ROM, thus risking bent or broken legs. ROM Manager avoids these clashes and therefore my alternative name for this chip is shinguard!

The controlling commands allow a particular ROM to be specified as default, so receiving all commands preceded by *DEFAULT. Alternatively the operator may use *DIRECT and send the command directly to the desired ROM.

If these command names clash then an identical alternative is to use

→

INFORMATION COMMANDS

*NAMES	Lists the names and socket locations of ROMs present and indicates if they are active.
*STATUS *rom*	Displays information on a selected ROM concerning title, location, copyright notice, length and language or service entry.
*CHECKSUM *rom*	Generates a CRC code for a specified ROM.
*VALUES	Provides information on location and priority of ROM Manager, filing system in use and default ROM selected.
*EXPLAINFX *number*	Briefly lists the first 22 *FX calls or gives detailed information on a selected one.

MEMORY MANIPULATION

*EXAMINE *rom address*	Memory dump of named ROM from address or &8000.
*MODIFY *address*	Edit memory from given address or PAGE.
*FUNCTION *key number*	Display contents of one or all function keys.
*INCLUDE *address*	Place user RAM routine name in ROM list.
*REMOVE	Disable RAM-based routine.
*RAM *command*	Pass command to RAM-based routine.

CONTROLLING COMMANDS

*SPECIFY *rom*	Specify the ROM accessed by *DEFAULT.
*DEFAULT *command*	Send command to specified ROM.
*DIRECT *rom command*	Pass command directly to named ROM.
*VECTOR *rom command*	Alternative to *DIRECT.
*FILE *command*	Pass command directly to filing system.
*STOP *rom*	Disable named ROM.
*START *rom*	Enable a disabled ROM or all ROMs.

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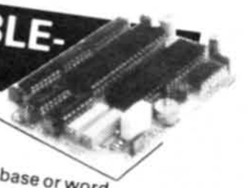

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*VECTOR. Furthermore, specific ROMs may be disabled (*STOP) to keep them quiet when passing commands around.

I think the programmer of this ROM, Richard Armitage, must be a real pessimist or have previously worked for NASA to have employed so many backup systems!

The disable ROM option was particularly useful when more than one DFS chip, or other filing system, was present in the machine at the same time (for example when testing software compatibility) as the user could switch off individual chips.

The remaining command in this section, *FILE, allowed the user to send star commands directly to the selected filing system without them being intercepted by ROMs. I found these facilities particularly useful when reviewing the seven toolkit chips in the October 1984 issue, as many clashes occurred before I had learnt all the star command names.

Another utility is *EXPLAIN which provided information on commonly used *FX commands – though I would expect most programmers requiring this to already have a copy of the Advanced User Guide at their side.

The space occupied by these details could surely have performed something more useful, for example providing routines to create protocols for ROMming Basic programs.

Finally, *FUNCTION was equivalent to the best any of the toolkit chips could offer, but still leaves room for the addition of a clear function key and function key memory used option in later versions.

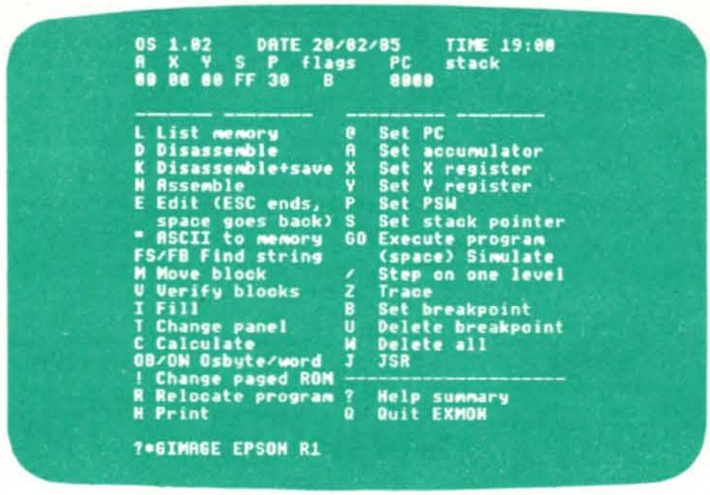
The only real problems/bugs I noticed was the mess *NAMES, *STATUS and *EXAMINE made of the title and access to Pace's Toolstar ROM – though I expect this was due to that infernal blinking purple star again.

If you wish to know which ROMs are sitting where in your micro without repeatedly taking the lid off and want to be sure your star commands go where they are supposed to then ROM Manager is for you.

At around £20 it may well pay for itself in saving replacements of "legless" ROMs alone.

If you are an avid ROM collector then your main problem may well be finding room for this chip. Perhaps ROM Manager will reach its heyday on Watford's new 146 ROM extension board.

Mike Mahon



```
OS 1.02    DATE 20/02/85    TIME 19:00
A  X  Y  S  P  flags   PC   stack
00 00 00 FF 30   B     0000

------- --------   --------- --------
L List memory      @  Set PC
D Disassemble      A  Set accumulator
K Disassemble+save X  Set X register
N Assemble         Y  Set Y register
E Edit (ESC ends,  P  Set PSW
  space goes back) S  Set stack pointer
" ASCII to memory  GO Execute program
FS/FB Find string     (space) Simulate
M Move block       /  Step on one level
V Verify blocks    Z  Trace
I Fill             B  Set breakpoint
T Change panel     U  Delete breakpoint
C Calculate        W  Delete all
OB/OW Osbyte/word  J  JSR
! Change paged ROM --------------------
R Relocate program ?  Help summary
H Print            Q  Quit EXMON

?*GIMAGE EPSON R1
```

Investment in security

Securit
Elm Systems

THIS ROM is designed to protect your BBC Micro against unauthorised use. When installed in the most significant or rightmost ROM socket of your system it will prevent anyone without the correct password and the correct matching password file from operating the machine.

On switch on or Ctrl+Break a screen will be displayed listing the name, address and telephone number of the owner and the micro's serial number, all of which have been burned into the ROM on manufacture.

The operator is required to enter a password which is not displayed on the screen while being entered.

At this stage only star commands for examining the catalogue, and changing drive, directory and between disc and tape are allowed.

When Return is pressed after the password is entered, the micro searches the current filing system for a file called PSFILE.

This is checked by the SECURIT ROM against some of the identity information using an encryption technique.

Thus each password file is unique to the combination of the password used and the identity burned on to the ROM.

If the password is incorrect, two more attempts are allowed before the machine is locked and a message stating password violation is displayed on the screen.

This is accompanied with a violent collection of alarm sounds from the speaker!

I tried every trick I know and I could not get the BBC to run without using the correct password.

It is impossible to auto-boot until the password has been accepted and access granted. Once having aquired access it is possible to switch off the security system by typing *UNLOCK, after which files can be booted. The machine remains unlocked through Break, Escape, Ctrl+Break and Ctrl+Escape+Break until switched off.

*LOCK reactivates the security system, so that the use of Ctrl+Break reactivates the password mechanism, useful if one intends to prevent curious users from getting out of your program.

Syntax information on Basic commands is provided on typing *HELP followed by the command. This supports all the commands I have tried in Basic I but does not extend to Basic II.

Access to other utilities on the ROM is by *SECURIT which presents you with a menu offering password alteration, realtime clock, datestamp and ROM on-off control facilities.

In order to change the password the old password must be re-entered, so

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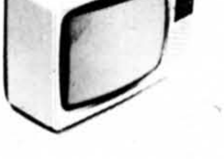

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preventing another user from creating his own password file when allowed access to the machine by the password holder.

The realtime clock requires resetting with date and time each time the machine is switched on, although it is protected through Escape, Break and Ctrl+Break.

The display, showing operating system number, date and time on the top line in Mode 7 only is activated by *TIME ON and de-activated by *TIME OFF.

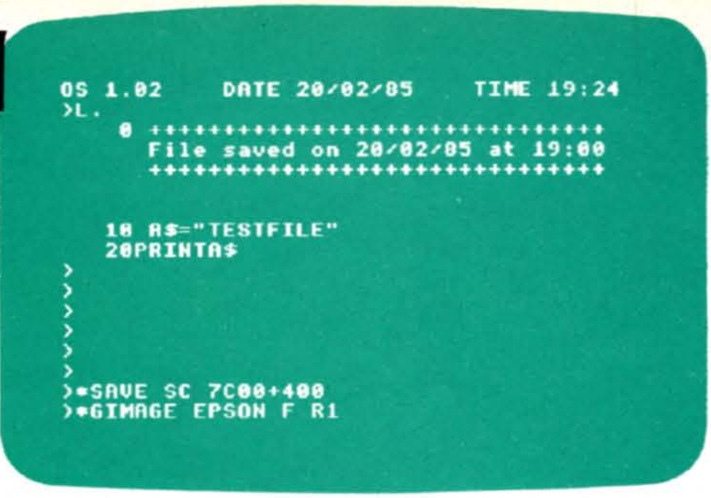
The area below this display is used as a text window.

In addition an hourly chime is sounded unless switched off by *CHIME OFF.

The time facility works well, only lacking the hardware to maintain time and date with the micro switched off.

Unfortunately the display interferes with the screen layout of Wordwise, Exmon, Starbase and other ROMs.

In addition, for some reason, the Operating System is displayed as 1.02 instead of 1.20 at the beginning of the time message.



```
OS 1.02     DATE 20/02/85     TIME 19:24
>L.
      0 ++++++++++++++++++++++++++++++++
        File saved on 20/02/85 at 19:00
        ++++++++++++++++++++++++++++++++


   10 A$="TESTFILE"
   20PRINTA$
>
>
>
>
>
>
>*SAVE SC 7C00+400
>*GIMAGE EPSON F R1
```

With the time and date set, selecting *DATESTAMP ON labels all Basic programs when they are saved with the time and date in line 0.

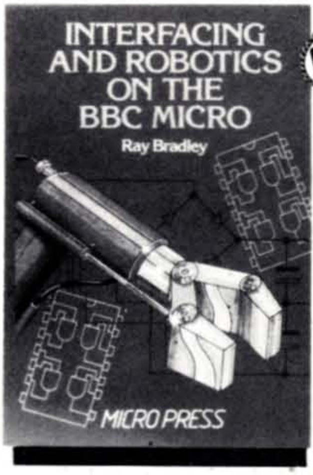
This facility is probably one of the most useful I have encountered as I am always forgetting which version of a program is the most recent.

Selecting the ROM management option enables one to switch on or off ROMs at will. A very helpful routine, which works well even though it is not able to read the names of all the ROMs to which I have access. Perhaps these do not follow Acorn's standard for sideways ROMs.

SECURIT is not Tube compatible, but should prove a valuable aid to those whose micro needs protection against unauthorised use. Any thief trying to use it without the password will have a hard time.

The other facilities are useful, especially the datestamp, and together they make SECURIT a good investment.

Ian Whitmore



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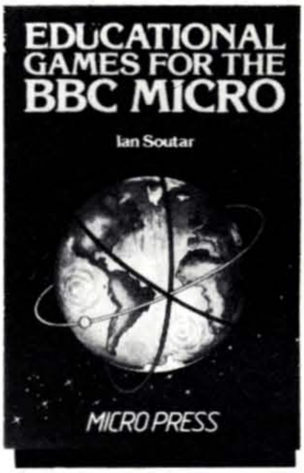

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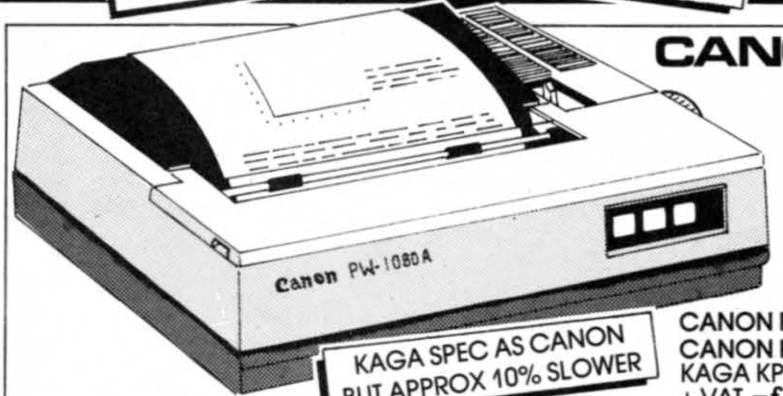

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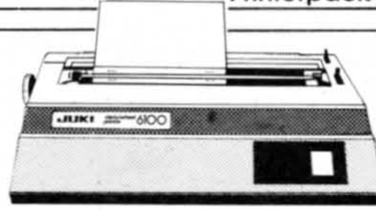

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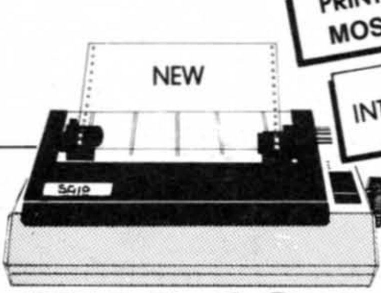

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PROBLEM PAGE

Your technical queries answered by MIKE COOK

BBC's keyboard is no sluggard

WE have two BBC Bs at work where we are currently installing a computer system.

There is an opportunity to use Torch Graduates to convert the BBCs to IBM-PC compatibility and run professional software on them, and we would very much like to use one of the first-class word processing packages like Multimate.

Never having used a professional word processor, we are not sure whether the BBC keyboard is sufficiently flexible for the job.

There is no keypad or ALT key, which are used extensively in these programs, and I am thinking that the limitations of the keyboard may slow down efficient use of the application.

The only answer I can come up with is to buy another keyboard such as Torch or IBM and connect it to the BBC instead of the built-in keyboard. The 99 dollar question is: Will it work?

Both Acorn and Torch have given me the same opinion – "It should work in theory, but we've never tried it". – *A.T. Roberts, Swan Holidays (Westward), Torquay.*

● **I don't think that the BBC's keyboard will slow you down. A keypad is not essential and the ALT key functions can be taken over by Ctrl.**

Also the 10 user function keys are quite useful. If you have tried an IBM PC keyboard I think you will be glad you have a BBC Micro. I don't like them very much.

As to fitting one on to the BBC, it is not just as simple as removing the old one and fitting the new. The electronics are totally different, so you would have to make a small interface board.

Then you would need a software patch to make the codes compatible.

If you are thinking of downgrading (whoops – upgrading) to a Graduate then I think you will find the keyboard is the last of your troubles. I would strongly recommend that you try the product before parting with your cash.

If you have a desire to try professional software why not go to a Z80 second processor and try the CP/M software?

In my opinion CP/M and IBM are not all they are cracked up to be.

Thermal fault

I HAVE a single density 8271 based interface with Acorn 0.9 DFS.

In last February's Micromail, John Schofield wrote about disc interface trouble which word for word is exactly what has happened to me.

I have sent my BBC to be repaired after having exhausted all attempts at swapping chips, etc, all of which led to the same "Disc error 18 at . . .".

One interesting point is that the disc system would work from cold for about five minutes only to hang up again.

This makes me think that some thermal fault might be responsible, which is why I sent it for repair.

Could you give me your opinion, so that if nothing comes of the repair I might have some idea what's wrong? – *George S. Barr, Stirling, Scotland.*

● **Without examination of your computer it is difficult to say what it could be. If it is a thermal fault, you could try tracking it down to a single chip by use of a hairdrier and a can of freeze spray. But if you had no joy chip-swapping I doubt if it is a chip unless it's the big one, the 8271.**

It sounds to me like something mechanical, like loose joints or cables, but you have already checked that.

Unfortunately, service personel are not always as good as they should be and I do not know enough of your area to advise you which to avoid.

Plump for a monitor

I HAVE been operating my computer on a 14in colour portable. The colour display obtained leaves a lot to be desired.

I had decided to get a monitor, probably medium resolution Microvitec.

With the advent of TV/monitors I have become perplexed. Especially now that I see a Fidelity monitor at about £195 available in a TV/monitor version for £225.

Can you tell me if the version of standard monitor gives a better display than a TV/monitor – Grundig, Philips, Ferguson type?

As I want the best, should I aim to get a monitor as opposed to a TV/monitor or monitor/TV? – *D.J. Turner, Margate, Kent.*

● **If you want the best, get an RGB monitor. The TV/monitors normally accept only a composite video input and this is not as good as an RGB input.**

Also the resolution of the tube is normally better in a monitor. I think these are just gimmicks the TV manufacturers have come up with to boost sales.

Micro flasher

PLEASE could you send me a price list and details of items to fit or add to the BBC B. I would be most pleased if you could send specific details of accessories to control disco lights, using the computer, kits and ready made items. – *Nigel Stone, Cambridge.*

● **Well that's a tall order – there are so many things you can add onto the BBC Micro. But as to your specific request for disco lights I think I can help you. The Body Build packs available should be able to do this for you.**

Packs 4 and 5 will allow the computer to switch on mains lights. Pack 4 is rated at 2 amps (up to 500 watt lamps) and Pack 5 is rated at 10 amps (up to 2400 watt lamps).

You need to connect these to the computer using a ribbon cable. The easiest way to do this (but not the cheapest) is to use Packs 1 and 2 – a transition board and ribbon cable. Your computer can then switch the lights on and off.

If you want this to happen in time to the music Pack No. 8 will split sound up into four frequency bands and feed it into the joystick port.

You then need to write a short program to look at each channel in turn and turn the appropriate light on if the sound is loud enough.

Full details of these kits can be found in the back issues of *The Micro User*. See the order form for the dates and prices of each pack.

Putting boot in

I HAVE two disc drives, an AMS 3in minidrive and a Viglen 40/80 track switchable.

I purchased the 3in one first, mainly so that my two children could use it and stand less chance of damaging the surfaces of the discs.

The problem is that if I use the 3in drive as Drive 0, so my children can use the auto boot, the Viglen drive becomes Drive 1.

While this is no problem under some circumstances, some discs will only work when auto booted, for example, Disc Executor, Clares Replica and B-Base.

I also have a feeling that Elite, which is only available on 5¼in discs, will not work using *EXEC !BOOT which I have tried unsuccessfully with the Clares discs.

Is there any method available which will make Drive 1 start up as if it has been auto booted? Perhaps a software fiddle?

I have partially solved the problem by connecting a switch on the rear of the 5¼in to switch it from Drive 1 to Drive 0 and back again.

But that requires me to

→

From Page 53

remove the ribbon cable from the 3in drive each time – because whereas the Viglen drive uses links to configure the drive number, the AMS uses a DIL switch, which, while possible to wire up, means quite a lot of soldering and wirework.

What I really need is to be able to switch the drives around using a software routine. – *WO2 D.T. Owens, BFPO 38.*

● **Man does not live by *EXEC alone. Some software needs a *RUN !BOOT to get it going.**

The only software fix is *Drive 1. If the software gets round that, it will get round most others.

The best way is to tease out the drive enable 0 and 1 wires from the ribbon cable. These go to pins No. 10 and 12 on the connector.

Snip them off and wire a double-pole changeover switch to swap the connections over. Then bind the switch with masking tape and use epoxy resin to take the mechanical strain.

Model B upgrade

I – AND many others, I suspect – am very interested in up-grading my BBC model "B" Micro.

To this end I read recently of an 8 bit compatible chip the W65SC816 which could address 16 mbytes of memory.

I understand it may be possible to take out the BBC's 6502 chip and drop in the pin-compatible 8-16 bit chip.

However, not being a micro veteran and having only the barest knowledge of electronics, I am in your hands as to what will, or will not work. – *G. Woodcock, Carrick-on-Suir, Eire.*

● **I have been passed the data sheets for the new chips and they make interesting reading.**

It would be possible to fit the W65SC802 in place of the chip in the BBC Micro. Also, with the simple addition of a board, the W65SC816 should be able to be fitted.

That's the good news. The bad is that the only advantage you could take of the new instructions and memory (if fitted) would be from machine code.

Basic simply would not recognise the new memory and the machine would go on as before.

What is needed is a re-write of the Basic interpreter, which unfortunately is beyond me.

Mute modem

FOLLOWING your Beeb Body Building Course on modems my dad bought me a 300-baud acoustic modem. I typed in the program which operated your modem.

When I finally debugged it and got the modem working, my dad told me that your program was written for a modem which was meant to be connected to a port other than the RS423.

I have tried changing the program around so that I may use it on my modem, which is connected to the RS423 port via a 255 bit port, but as yet I am unsuccessful. – *N. Butler, Horsham, Sussex.*

● **My software should work with your modem. The program contains extra bits to control the modem chip via the user port, but all data transfer is via the RS423 port.**

I can only think that you have not wired it up correctly.

Out of step

WHEN somebody from a shop specialising in BBC computers tried to fit a Solidisk DFS in my BBC Micro, we ran into trouble. The disc started to turn, but the steppermotor did not function.

Another DFS was tried, even a Acorn DFS was put in. None worked properly.

When one of the DFS interfaces was put into another computer everything functioned the right way.

We concluded that the fault was somewhere in my micro. I left the machine with the repairman, who phoned me after a week and told me that he had tested everything and that he could not find anything out of order.

My BBC-B has Basic II, OS 1.2 and board issue 4.

Could you suggest a solution to this problem? – *Frederik Alons, The Netherlands.*

● **This problem is nothing to do with the DFS chip. When you say the disc started to turn, had you typed anything in to make it do this? A constantly spinning disc is the hallmark of the disc ribbon cable being plugged in the wrong way round.**

Your dealer should have an oscilloscope. Get him to look at pin 36 on IC 78 as this should show the stepping pulses being sent to the head.

If that's OK, look at pin 6 on IC80. This has the same signal on it. If that is OK, then you have a problem with your cable connecting your drive.

If those pulses are not there, then you have a problem with the disc interface circuits. Check that S9 is cut.

Hope this is of some help.

Swinging problem

WE are a sixth-form group studying for the City and Guilds 365 certificate. We recently built the Pendulum project as described in the November, 1983, issue of your magazine.

We were most disappointed when it did not work on our BBC and wonder if you can help us.

The pendulum was tested using an oscilloscope and gave a correct motion of the spot.

We have tested the connections in our D plug using a meter and are sure they are correct.

The program prints up the initial commands and when we press a key to clear the screen it puts a mark at the top left hand of the screen and then does nothing else.

We have tried typing the program in several times, but no luck.

Our machine is disc based, so we have saved copies of the program. If we connect a joystick to the analogue port we can manually draw a trace, so it seems that the program does work. – *Christopher Birkett, Salesian School, Chertsey, Surrey.*

● **Nobody has reported this problem before. Do you get a trace when you move the pendulum pot by itself without letting it swing? Perhaps you have the pot on the wrong part of its travel?**

Try removing the trigger portion of the program. Whatever is going wrong, it is something very simple.

Torch discs

IN your October issue I was surprised to read the advice given by Mike Cook to a user with the Torch Disc Pack.

Among the problems discussed was the ability to read 40 track discs. The user was advised to try another DFS.

However the Torch Disc Pack comes complete with a utility called COPIER which will format, copy and verify discs in either Torch or Acorn format, in 40 or 80 track configuration.

So although you may not be able to use a 40 track disc, you can certainly copy it to 80 track and use that, which seems perfectly reasonable to me.

The user also had difficulty with PAGE being set rather high for operation as a simple BBC Micro.

For this it was recommended that the ROMs be moved so that Torch's CPN was not the default. Heaven forbid!

This never used to be a problem with the old CPN ROM, but with the newer MCP ROM you have to do a bit more. After getting into the Basic ROM (Type Basic or *B.) type B Break Break, that is, hold B and dab the Break key.

This resets all the pointers needed, but leaves you in tape mode – a security measure to avoid overwriting your CPN discs.

Take your finger off B and dab the Break again and you're ready.

There is now a Torch users' group, Sidelight, 69 The Avenue, Wembley, Middlesex HA9 9PH. – *G.F. Sargent, Loughborough, Leicestershire.*

● **Thanks for the information. As you suspected, my experience with the Torch system is based on the CPN system.**

IF you have a technical query for this page, send it to Mike Cook, *The Micro User*, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Letters on other subjects should be sent, as usual, to Micromail, which this month starts on Page 169.

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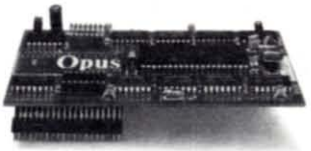

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Only: **£359**

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Complete BBC B ECONET Networking System now available.

(P.S. ROM based software purchased with any of the above Micros will be fitted free of charge).

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Dust Cover for BBC Micro

Protects your expensive Micro from foreign bodies while not in use. **£3.50**

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● EPSON RX80 Printer	**£209**
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Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

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The new Epson JX-80 DOT MATRIX COLOUR printer is fully compatible with the popular FX-80. Using a four colour ribbon, printing can be in 7 colours with speeds of up to 160 CPS. It is capable of 80 characters per line or 137 in condensed mode. Its resolution is selectable from 480 to 1920 dots per line. The printer has a friction and fully adjustable tractor feed mechanisms as standard.

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SAKATA SCP-800 printer/plotter facilitates plotting & printing in 4 colours on paper upto A4 size, using easily replaced pens. In text mode it prints upto 12 CPS. Max 160 Char. per line. In graphics mode it offers full plotting facilities incl. drawing, moving, scaling of text, rotation & drawing of axes. (Write for a sample printout).

Only £175

Set of 4 SPARE PENS only **£3.95**

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Allows 3 BBC Micros to be connected to one Printer. **Only: £65**

BROTHER HR-15

Brother HR15 is a high-quality daisy-wheel ideal for a budget printer for serious use. Notable features of this printer include a 3k buffer, 18cps (max), bi-directional proportional spacing, Centronics or RS232 interfaces as standard, optional Sheet Feeder and Keyboard.

With immediate effect, we are offering at no extra cost ON-SITE 12 months Maintenance on all HR15 Printers purchased from WATFORD on or after March 1985.
W.E. GIVES YOU A GREAT DEAL

ONLY **£325** (carr. £7)

Single Sheet Feeder	**£195**
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RIBBON CARTRIDGES:
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6264LP (8K) £8.95

KAGA KP810 NLQ PRINTER

This Dot matrix printer has EPSON FX/RX compatible control codes and is functionally equivalent to an FX80 with the added advantage of its 'Near Letter Quality' mode. It is solidly built and features include: Normal, Italic, Enlarged, super/subscript, proportional spacing and user-defined character set. Extras over the FX80 included in the price are Near Letter Quality (NLQ) print ideal for correspondence, Proper adjustable tractor feed, half speed quiet mode and 3K buffer. The printer is bi-directional and logic seeking to give a speed of 140CPS for high throughput in conjunction with the standard 3K buffer. 8K RAM may be added to give more user-defined character sets. Centronics parallel interface + Watford's 12 month NO QUIBBLE WARRANTY.

Special Offer: ONLY **£252** (£7 carr.)

RS232 interface + 2K buffer to connect to other micros. **£89**

NLQ FONT DESIGNER

For this NEW ROM (latest in NLQ Technology from Watford) please see later pages of this advert.

EPSON HI-80 PLOTTER

The latest addition to the popular range of EPSON Printers/Plotters. Prints in upto 10 colours. Has many more features. Please write in for spec sheet.

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Similar to the KP810 but with 17" carriage for wide print. Gives 156 columns of normal print or 256 columns in condensed mode. Ideal for printing out spreadsheets.

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PRINTER LEAD

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 feet long)	**£7**
Extra long (6 feet long)	**£9**

We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop.

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- 1431 – Medium resolution as used on the BBC television computer programme **£165**
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All Microvitec Monitors are 14" RGB in their distinctive right angle sturdy metal case or the new beige plastic case. They are supplied complete with connecting lead to the BBC and a 3pin mains plug.

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- KAGA Vision 2, Hi-Res, RGB Colour Monitor **£225**
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ZENITH

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. The high resolution makes it good for games too – you can really see the detail that has been put into the graphics ...... ONLY **£66**

LEADS

BNC Lead for Zenith or Philips **£3**
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MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford Electronic's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

There is even a handy section describing the phrases you are likely to encounter, and how to interpret them. This book must be an essential purchase at £5.95, especially if you own or are thinking of buying a disc system.

£5.95 (Book No VAT)

BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in for a demonstration.

EXAMPLE PACKAGE
BBC Model B, Watford Electronics' DFS upgrade, WORDWISE ROM, Twin 400k Epson drives in beige, Zenith 12" Hi-resolution monitor (Green or Amber), Brother HR15 daisywheel printer. Gemini software: BEEBCALC spreadsheet, analysis and DATABASE software on disc. 10 × 3M disc, 500 sheets fan-fold paper, 4 way mains trailing socket, manuals, all leads and BBC carrying case.

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ROMSPELL is the new fast Spelling Checker ROM from Watford. Packed with excellent features, ROMSPELL is probably the most advanced spelling checker available for the BBC micro.

Features include:

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ROMSPELL is fantastic value at **£25**

(Please specify 40 or 80 tracks when ordering)

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This Light Pen for the BBC micro is packaged in a neat pen shape with built in switch. Supplied complete with our sophisticated Pen-Pal software on cassette (see elsewhere in this ad).

Only **£23**
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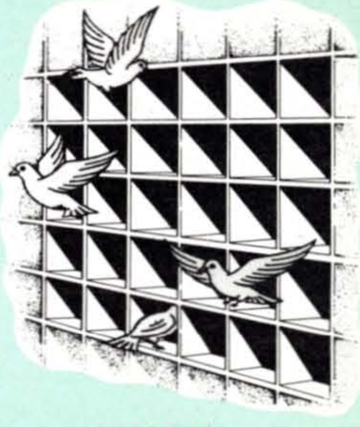
DATABASE MANAGEMENT SYSTEMS



DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

On disc at **Only £17**

(Please specify 40 or 80 track when ordering)
(Please write in for technical specifications)

FILE-PLUS

The File-Plus package is even more powerful and flexible than Disc-Data. It is also largely menu driven but has its own command language for file searching. The 16K ROM contains all the normally required routines, with lesser used options supplied on the utilities disc. All input and output formatting is controlled through screen forms. A full screen editing system is used to define a form which allows tremendous flexibility in the format in which your data is displayed. It is very easy to change from form to form so that you can type in your data with one form, and examine it with others. You will typically design several forms before starting to access the database so that you can quickly and easily see the fields of each record that you want to appear in the layout you decide on. The form system is also used for output to your printer.
File Plus has a unique file linking system that allows the entire on-line storage of your system to be used for one database. This can give around 1.5 Megabyte databases using dual drives and double density.
The built in FQL (File-Plus Query Language) can be used for searching the database. Presented in the form of a powerful command language with looping facilities etc. this allows the most flexible access to your data possible. Full arithmetic operations are provided to allow the system to be used for statistical analysis.
Operations supported are –, +, *, /, +–999999 9999.9999 and compare facilities =, >,<>>=, >=, <, &,.
Many keywords are supported by the language: assign, compare, display, and, goto, iff, ift, print, read, search, spool and update.
Supplied with a very detailed 70 page manual to explain all the facilities with many examples.

Only £43

(Please specify 40 or 80 tracks for the utilities disc)

DATAGEM

Gemini's 24K ROM based DATABASE Management System
Special Offer: **£99**

Continued →

The ULTIMATE DFSs for the BBC MICRO

Adding disc drives to your BBC is probably one of the best ways of improving the power of your microcomputer system. Watford, with their reputation for providing quality products at an affordable price, have available a full range of disc drives and associated products, including:

- *Disc Filing Systems*
- *Disc drives*
- *Disc covers*
- *Floppy discs*
- *Disc boxes*
- *Disc cases*
- *DFS Manuals*
- *Disc drive cleaning kits*
- *Disc based Software*

Watford Electronics supply two highly sophisticated Disc Filing Systems specially designed to be fully entry point compatible with Acorn's standard DFS. As well as this, these two DFSs provide significant and powerful enhancements to allow the user greater ease in acomplishing a given task.

Many people who are about to buy a DFS find themselves wondering which one to opt for: should they buy the standard Acorn one and restrict their available features, or should they buy one of the other DFSs and find themselves running into compatibility problems if they opt for the wrong one? Before you look below to see the vast range of extra features that our DFSs provide, may we just point out that our DFSs are fully Acorn compatible; not just partially, like some of the "competition". We have been supplying DFSs for two years now with many thousands of satisfied users. Also, please note that the Watford DFS is supplied by a reputable firm via proper mail order and shop premises.

Just compare the features:

Features	Acorn	Watford	
	1.20	Single Density	Double Density
Max nos. of files per disc side	31	62	62
Max disc capacity	800k	800k	1440k
Tube compatible	Yes	Yes	Yes
Built-in Editor	No	Yes	Yes
Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
Copy between densities	N/A	N/A	Yes
OSWORD &7F	Yes	Yes	Yes
Full entry point compatibility	Yes	Yes	Yes
Retain information over a break	1.20 partial	1.42 Yes	1.52 Yes
Games compatibility	Yes	Yes	Most
Econet file server	Yes	Yes	Yes
Econet station	Yes	Yes	Yes
Full wildcard facilities	No	Yes	Yes

Note that whilst BOTH of our DFSs are compatible with the 6502 and Z80 Second Processors, the Acorn DNFS ROM (supplied by Acorn with the processors) should be present within the machine for the Tube transfer protocol. Our single density DFS is compatible with the Torch Z80 system. With the current versions of our DFS and DDFS, "PAGE" will remain unaltered by the presence of a DNFS ROM; i.e. the normal value of &1900 is retained.

THE WATFORD DFSs

Designed to offer power and flexibility, the two versions of our DFS are packed with features such as:

- *Acorn's slightly antiquated DFS allows a maximum of only 31 files per side of a disc. OUR DFSs cater for either 31 or 62 files per side of a disc. In 62 catalogue mode, all these files are available and displayed as one continuous catalogue; not a collection of small catalogues that require extra effort on the part of the user to swap between. We have found that 62 files is adequate in normal use (more would require altering "PAGE", which is undesirable – again this is due to the way in which the BBC micro is organised).*
- *Built into each Watford DFSs are the disc Formatter, Verifier and Sector Editor that are so useful and essential for the operation of a DFS. We do not ask you to pay extra for these features with our DFSs – they should always be present within a perfect DFS and therefore included in the price.*
- *One of the excellent features of the BBC is its 80 column mode of operation. Acorn's DFS, unfortunately, only displays in 40 columns even in these 80 column modes; ours displays the catalogue correctly in 4 columns. This feature has now been extended to include the 80 column display of the filing system information at the top of the catalogue as well.*
- *When working on a program, most "load and save" operations to the disc will use the same filename (ie that of the current program). To save typing, and minimise errors, our DFS has a novel feature whereby a "default" filename can be entered. Once this is done, the usage of a null filename will cause this previously entered filename to be used.*
- *Catalogues produced on the screen by our "Ultimate" DFS include extra information to say how many files are present within the catalogue, whether the catalogue is 31 or 62 files in size, how many tracks are on the disc, and whether the double stepping mode is active, etc.*
- *Due to the way that Acorn decided files should be stored, there is occasionally a need to "compact" the available spaces on the disc. As this can alter the contents of memory, we decided that it would be useful to implement a command that informs the user whether compaction is necessary, and if it will actually result in any significant gains.*
- *One standard requirement of a filing system is to be able to rename files. Acorn's simple DFS only allows for one named file to be changed to another named file. Our "Ultimate" DFS allows for groups of files to be renamed. For instance:*

RENAME *BERT* *FRED

will take all the files that have BERT in their name, and change the BERT to FRED.

- *The OPENOUT command on both versions of the Watford DFS has been improved so that it automatically selects the largest available space on the disc; thus minimising the frequency of the Can't extend error messages.*
- *Both of our DFSs feature, as standard, the ability to make a normal 80 track disc drive read and write 40 track discs. This is normally accomplished by an expensive manual switching unit on the drives; our DFS does this as standard.*
- *The software switching aspect of our DFS and DDFS is far more flexible than a standard switchable drive. The reason for this is quite simple: a switchable drive means that both sides of the disc are either 40 OR 80; you cannot have 40 track on one side and 80 track on the other side with a standard switchable disc drive. The Watford DFSs are fully independent, and thus far more powerful. With the DDFS, both the density and the 40/80 aspect are independent; thus offering incredible flexibility.*

There are many other features of the Watford DFS too numerous to mention, but all well documented in the excellent DFS manual sold separately.

WATFORD's SINGLE DENSITY DFS

This popular and widely acclaimed DFS has now been available for two years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn's standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for the price of this upgrade.

PRICES

● *Complete Disc Interface Kit incl. DFS ROM & fitting instructions*	**£79**
● *Acorn's DFS Kit complete*	**£75**
● *DFS Manual (Comprehensive)* *(no VAT)*	**£6.95**

(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)

● *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only*	**£14**

- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these!

The Watford Electronics DDFS will operate with discs formatted in either single or double density; the density is automatically sensed on an access to the disc and this is then remembered for future accesses. The built-in formatter prompts for the density when a disc is formatted, allowing the user to select the density of his own discs.

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

● *Complete DDFS Kit incl. fitting instructions*	**£85**
● *DDFS Manual* *(no VAT)*	**£6.95**
● *We will exchange your existing Single Density for our DDFS Unit at*	**£40**

Quality Disc Drives from Watford Electronics

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

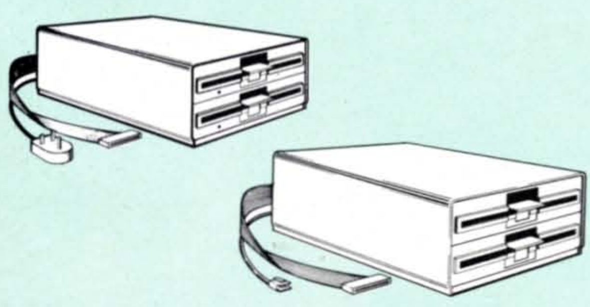
The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).

With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them. Users of Acorn's DFS will find that they need to pay the extra for switchable drives if they wish to use 40 track discs in an 80 track drive.

Both the EPSON and MITSUBISHI drives that we supply are fast (3ms track to track, 15ms settle), quiet and have a low power consumption (average well under 1 amp). Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro. Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

Names you can trust, at prices you can afford!

If you look around the popular BBC micro press, you will find that the prices we quote are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal. STOP PRESSS – SEE LATER FOR AN EVEN BETTER DEAL.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tsts within our workshops have confirmed this.
All disc drives advertised here will operate in double density mode with the appropriate interface and software.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS100 £85		CS100 £119	
200K (360K)	CLS 200 £89	CLD200 £165	CS 200 £129	CD200 £194
400K (720K)	CLS 400 £120 £130 CLS400S	CLD 400 £175	£145 CS 400S	CD400 £200
800K (1.44M)		CLD800 £235 £265 CLD 800S		£285 CD 800S

Prefix *C = Cased Drive*
L = Less PSU
S = Single
D = Double

Suffix *S = 40/80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

FREE FREE FREE FREE

As an added bonus to customers of Watford Electronics who purchase disc drives from us, we are now including a special utilities disc ABSOLUTELY FREE!

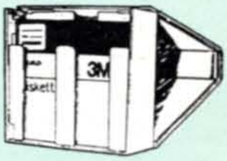
This disc contains a disc formatter and verifier (especially for those who own the Acorn DFS), Watford's popular "Centipede" like game called CRAWLER, a fascinating graphics program, a disc/high score data base index program and a special utility for "REMOVING" by software, ROMs from a machine; this feature is operative over a Break, providing that the workspace is not corrupted.

3M – 5¼" DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

FREE FREE FREE FREE FREE

Watford Electronics are now the biggest single distributor of 3M's 5¼" floppy discs throughout the UK. As a gesture of thanks, we are this month giving away absolutely FREE this Disc library case with every box of 10 discs purchased from us. (Offer valid until stocks last!)



DON'T SETTLE FOR LESS, BUY THE BEST

- *10 × S/S D/D 40 Track Diskettes* **£13**
- *10 × D/S D/D 40 Track Diskettes* **£18**
- *10 × S/S D/D 80 Track Diskettes* **£22**
- *10 × D/S D/D 80 Track Diskettes* **£24**

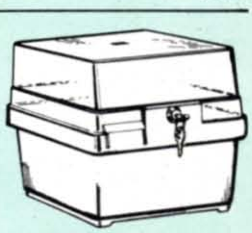
DISC ALBUMS

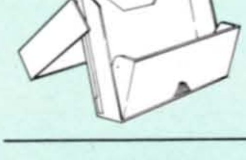
Attractively finished in beige leather-look vinyl, these conveniently store upto 20 Discs. Each Disc can easily be seen through the clear view pockets.

£4.25

LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.





PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE
holds 10 Discs. **£1.80**

FLOPPY HEAD CLEANER KIT

The heads in floppy disc drives are precision made and very sensitive to dirt. Drive manufacturers recommend that you clean the heads approximately once a week. Unless your home or office is dust free, one of these Kits is a very sensible precaution against losing valuable data. A dirty head can destroy many discs before you realise the trouble. Very simple to use.

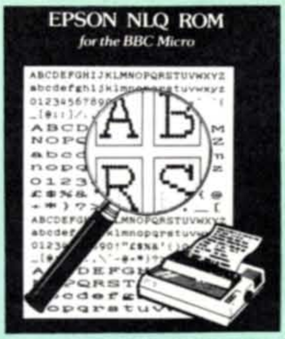
£9

DUST COVERS

(For our Disc Drives)

Single (without PSU) **£3.20** Twin (without PSU) **£3.85**
Single (with PSU) **£3.25** Twin (with PSU) **£3.90**

Continued →



Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £22

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

NEW LAUNCH

THE NLQ DESIGNER

The Kaga Taxan KP810 and KP910 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your promter so that it is available immediately when you turn it on.

A 40/80 track format disc containing plenty of example fonts, etc. is also included in the package.

(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading our adverts though – work is in development!)

SPECIAL INTRODUCTORY PRICES

NLQ DESIGNER & FONT DISC **£25**

INDIVIDUAL Preprogrammed FONT ROMS **£15**

(Please write in for further details on both the NLQ DESIGNER and the individual font ROMs available.)

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £24 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers:
CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/120/200/400, etc. etc.
Price including comprehensive manual

£24

P.S. Existing owners of Dump Out 2 may now upgrade to Dump Out 3. Please return BOTH the original ROM (with its label and serial number) and the manual to our "Upgrades Dept" with your remittance.

For a limited period only **£10.00**

VIEW

VIEW WORDPROCESSOR
We are supplying the new VIEW version 2.1 allowing printing of memory contents etc **£46**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft) **£49**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £9

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £8

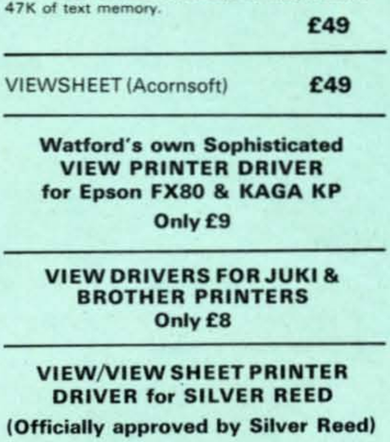
VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

A range of VIEW Printer drivers to complement the Silver Reed range of printers EXP400/500/550 & 770 EB 50 and converted typewriters EX43/44 & 55.

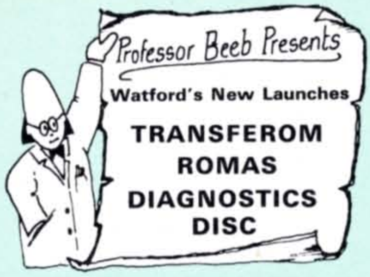
Only: £8

BEEB PRINTER ROM



This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:
★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.
★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.
★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.
★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.
★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.
★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24



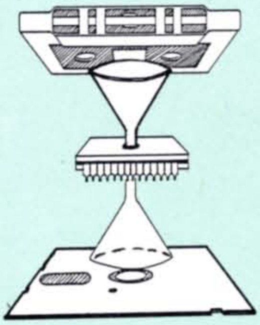
Professor Beeb Presents

Watford's New Launches

TRANSFEROM
ROMAS
DIAGNOSTICS DISC

TRANSFEROM

(Tape to Disc Utility)



After months of top secret development, we are now able to supply details of this advanced and sophisticated utility ROM for the BBC micro. Just look at the features:

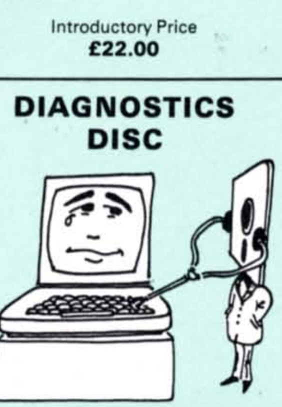
- Fully menu driven for ease of use
- Copes with locked programs
- Copies Elite
- Copies Aviator
- Copies very long adventure games
- Supplied with comprehensive manual

The single density DFS version of TRANSFEROM is available NOW, and the double density version is in preparation as YOU read this very advert.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc!

Introductory Price
£22.00

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Trial Price
Only £15.00

ROMAS

THE CROSS ASSEMBLE AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ND
6502
HEX
REM
ASM
CHR$
FAL
LD
Z80

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referencer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes two comprehensive manuals, providing detailed documentation and plenty of examples.

A give away at . . .
Only £45

Special Offer

Purchase a copy of ROMAS and our EPROM programmer (retail price £113.00), and we'll give you the very special price of:

£99.00! (£4 p&p)

Watch this space

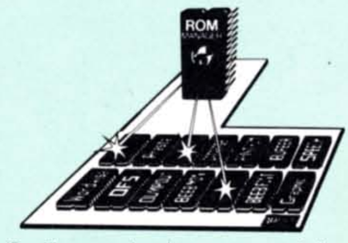
DELSYS is COMING

ADE

'Systems' complete program development package in a 16K ROM. Full assembling and debugging facilities provided. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£43**

ROM MANAGER



'Provides comprehensive management of all your installed ROMs – BEEBUG Nov. '84'.
This ROM is unique in its capabilities. It allows you, the user, full control over the BBC Micro's sideways ROM paging system with simple to use commands. This ROM is essential for those with several ROMs. At a simple level ROM MANAGER can be used to remove the problem of clashing command names and allow full use of all the facilities of your ROMs. This is coupled with facilities to completely enable or disable various ROMs in the machine including ROM manager itself.
ROM MANAGER can also be used to develop sideways ROMs using the machine's standard memory. This is achieved by sending sideways ROM calls to your code in RAM, saving the expense of fitting sideways RAM for ROM development purposes. ROM status reports are also given by the ROM, including ROM lengths, checksums, entry points supported and current filing system title.

The ROM also provides facilities to examine ROMs, list function keys for editing, modify RAM (using a HEX/ASCII editor) and list ROM titles neatly and concisely.

All selection between particular ROMs is by the name of the ROM and this may be abbreviated for convenience. ROM numbers can also be used if required. This ROM is very simple and obvious to use. All the facilities are explained in the clear and detailed manual.

Price **£22**

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces – keep reading our adverts though!)

Price only **£10**

(Please specify whether 40 or 80 track disc when ordering)

ULTRACALC 2

The mark 2 version of the BBC Publications extremely popular electronic spreadsheet ROM. Features include: Simple communication with program, with many prompting messages; Full range of editing commands; Efficient memory usage, allowing large spreadsheets to be constructed; The handling of labels, as well as numbers, as values; Individual variations of the width of columns; Display available in all screen modes; Operates as HICALC on 6502 2nd processor giving 44k of workspace; Flexible printer controls.

Only: **£66**

Continued →

Nightingale Modem

Now Watford brings you PACE's NIGHTINGALE MODEM PACKAGE including the popular Commstar ROM software for the BBC Micro. Nightingale is considered to be by far the most versatile BT approved modem available at the price for the BBC Micro. It is ideal for home or business use. It offers Prestel/Viewdata baud rates (1200/75 & 75/1200) as well as 300/300 baud full duplex for communication between BBC and other computers, including bulletin boards. A bargain at our

SPECIAL INTRODUCTORY OFFER

(Price includes COMMSTAR ROM & comprehensive manuals) **£119**

Nightingale Modem without software
Only £99

COMMSTAR ROM package only **£29**
(P&P on modem £2.00)

Watford's own Machine code Monitor ROM written by Andrew Bray (Cambridge), co-author of the BBC Micro Advance User Guide.

The most powerful and versatile machine code monitor ROM yet written for BBC Micro. It has all the normal memory editing, moving and relocating facilities, plus all editing is with a full screen editor allowing scrolling up and down memory, entering in Hex, ASCII or standard assembler mnemonics.

In use as a debugging tool, you run code under a total emulation system. Ever felt a desperate urge to set a break point in ROM? No problem – you can even have breakpoint on reading or writing locations in memory and on register contents. The system fully supports debugging of sideways ROMs e.g. BASIC can fully and easily be run from within Beebmon and from there DFS and other sideways ROMs can be used in total emulation mode.

Beebmon can even run itself. In so doing you can nest Beebmon up to a level limited only by the memory size. Beebmon uses 256 bytes of workspace, located anywhere in memory, even on the 1MHz Bus. Beebmon effectively uses no zero page workspace, so your program (e.g. BASIC) can use any or all of the base page. How does it achieve this? By providing a 6502 interpreter all programs running under it exist in a vertual BBC, so special memory locations like the ROM latch are not actually accessed by your programs, instead they alter a location in Beebmon's workspace. Emulation also allows immediate return to Beebmon command level by ctrl-escape no matter what code is being executed at the time. All this exceptional power and flexibility is complemented by a clear and detailed manual included in a value for money price of:

£24

DISASSEMBLER ROM

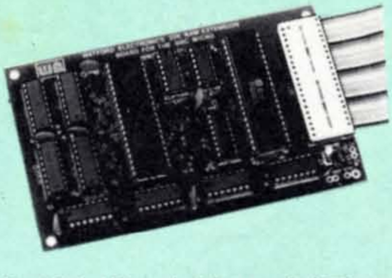
Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

ONLY **£18**

Please write in for technical details.

32K RAM

EXPANSION BOARD



Now Watford Electronics brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. It's ribbon cable simply plugs into your micro's 6502 processor socket. This compact board which fits inside the computer doesn't just give you 16k or even 20k of extra RAM, but a massive 32K!!!

There are many more useful facilities available with this board:

- The top 20K of the expansion RAM can be used as the screen display memory, leaving all the standard BBC RAM free for programs or data storage. This allows good graphics and long programs to be combined. For instance you could have MODE 0/1/2 GRAPHICS AND 28K OF PROGRAM SPACE. The extra memory can be used by virtually any language or utility such as BASIC, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, etc. and NOW COMPATIBLE with Beebug's TOOLKIT.

- The FULL 32K or the bottom 12K of the expansion RAM can be used as a PRINTER buffer for SERIAL PARALLEL printers, sound channels, RS423, keyboard or speech synthesiser. This allows very long text files to be printed while you are using 28K of program and 20K of graphics! THE BUFFER IS UNIQUE because it replaces one of the BBC Micro's buffers so all the buffer options are available on it. eg. *FX15,21, 138, 145, ADVAL(–no.) etc.

- This board is the IDEAL COMPLEMENT to any WORD PROCESSING system, disc or cassette based. There is no need to wait for slow printers as you can type in long text in 80 column display mode while printing is going on – TWO JOBS DONE SIMULTANEOUSLY!!! (an equivalent printer buffer would cost you £120 +).

- Unlike our competitors, the board is compatible with a vast range of software and hardware available for the BBC microcomputer, including our ROM expansion boards, double density DFS units, and the ATPL ROM extension board. This is because our board is connected to the computer by means of a ribbon cable without soldering. It can either be left in the micro or stuck to the lid with the 4 self adhesive feet supplied.

- The board comes with a comprehensive manual and ROM based software with a large range of commands for machine code and BASIC users, including many *HELP messages.

- Now the ROM has had a host of utilities added to the large number already provided and has been made even easier to install.

Only: £65

GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimensions to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER **£86**

BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software supplied on a 16K ROM. It allows you to display text on the screen in 13 different styles:

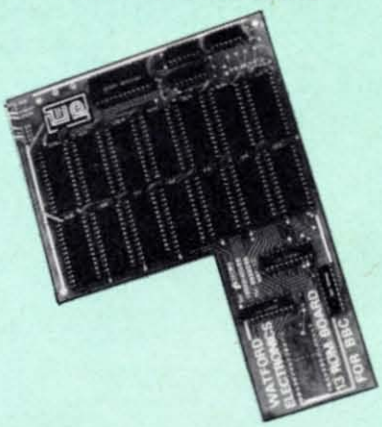
It works in modes 0, 1, 2 and 4 using the full colour capabilities of each mode. Characters are printed in the same way as normal. Selection between the various fonts is very easily achieved with Ctrl-V – press this followed by a font number and the output will continue in the new font. Beebfont ROM is particularly useful in display work with the characters produced at twice the normal size.

You can create your own character fonts with the editor supplied. You can also print-out pre-formatted text files using the special characters with Epson FX, RX and NEC printers. The full range of character styles can be used, controlled from within the text. The editor and spooler program are supplied with the package, on cassette or disc. The spooler allows word processor (Wordwise & View) output to be printed in the new characters.

A twenty page manual is supplied. Please state printer type and media for the editor & spooler when ordering (cassette, 40 or 80 track disc).

ONLY **£32**

Mk-2 13 ROM SOCKET EXPANSION BOARD



Now all lines fully buffered – On board battery back-up facility – will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.

Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. Unlike other ROM Boards, this board has been ergonomically designed to enable the user, easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, RAM Card, etc., without any clash. (At Watford, we think ahead).

Our Mk2 13 ROM Socket Board enables the User to increase the sideways ROM capacity from the basic 4 sockets upto full 16 capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the board meets or exceeds all timings for operation in the BBC Microcomputer.

Supplied ready-built and tested complete with fitting instructions.

Only £30

PCB NI-CAD Battery for ROM Boards.
£2.75

COMPUTER CONCEPT'S ROMS

CARETAKER Basic Utility	£28
Graphics ROM	£28
Disc Doctor ROM	£28
TERMI	£27
COMMUNICATOR	£58

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER THIS MONTH: **£32**

WORDWISE PLUS

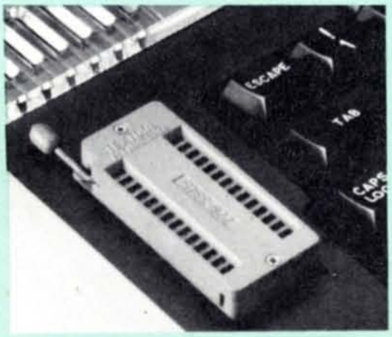
Now available from stock **£47**

WORDWISE PLUS UPGRADES

Existing users of Wordwise can upgrade to WORDWISE + for £17. Please return the old WORDWISE package complete with Chip and MANUAL with your remittance and we will send you the new WORDWISE + package.

£17

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING REQUIRED. The ZIF eliminates the possibility of damage to your ROM pins when inserting and extracting them.

- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.

- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

- This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£18**

THE AMX MOUSE

'The program is simplicity itself and the user manual is virtually redundant' . . . Micro User Jan. 85.

Bring into your home or office the last word in user friendly input devices for the Beeb. The AMX MOUSE that won the hearts and the minds of thousands of visitors at the Show has arrived at Watford Electronics at a very special price!

Using simple Icons, and small movements of the mouse on a work surface, you can select any one of the functions from the pull down menus. The mouse will operate from within Wordwise, View and many other software packages. The three buttons built in to the mouse are user programmable for many extra functions.

The package consists of the mouse, the advanced controlling software in ROM and a disc containing the Icon designer and the AMX ART software.

To summarise this superb product a comment passed by a very senior authority on BBC micro at the last Micro User Show was, 'My only criticism of the product is that, IT'S TOO CHEAP!'

OUR SPECIAL PRICE

ONLY: £68.50

FREE FREE FREE

This month we are giving away the sophisticated COLOUR ART package absolutely FREE with every purchase of the AMX Mouse from Watford.

COLOUR ART!

As seen at the Micro User Show

Watford Electronics has long been a source of innovation in the BBC field; e.g., we were the first to market a ROM board. Well now We've done it again!

The AMX Mouse is, as we are sure you already know, a very easy to use and powerful drawing package. Throughout the country, there is no single bigger distributor of this excellent package than Watford Electronics. To celebrate this fact, we are, during this month only, including FREE with every AMX Mouse package purchased from us the superb piece of software called COLOUR ART.

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Price **£13**

NEW

16K DISC RAM

This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM.

New Low Price: £35

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

Versatile BEEB SPEECH SYNTHESISER Unit

Beeb Speech Synthesiser

SIMPLY the best! – An unlimited speech synthesis system. Complete with easy-to-follow manual. Controlling software is in ROM so no Cassette Loading problems!

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THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

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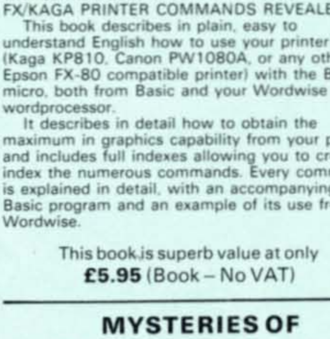
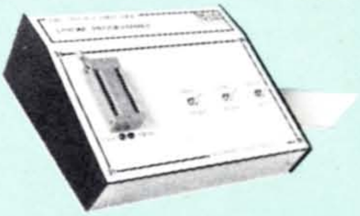
PLINTHS FOR BBC MICRO AND PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£19** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

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(£3 carr.)

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The features are:
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- Copy Eprom into memory and compute checksum.
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- Program EPROM from memory.
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- ● Made in Britain by a long established glass maker.

Available in 12" & 14" versions – please specify the exact monitor type when ordering.

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A 'Keyboard to Micro' replacement jumper lead.

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The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£11** (£2 carr.)

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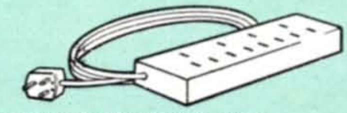

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EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

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The Voltmace system provides full facilities for connecting the Delta 14 handset.

Delta 14 handset – On its own makes a high quality centre sprung analogue joystick with fire buttons **£12.50**

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NEW

LOGOTRON LOGO

LOGO is a specially developed language carefully designed to teach the basics of both programming and logical, ordered thinking. Until recently, there wasn't a version of LOGO available for the Beeb. Now Watford Electronics are proud to bring the highly acclaimed version of LOGO from LOGOTRON. This version is recommended by most local education authorities.

Supplied on a 16k ROM for easy fitting, the LCSI LOGO is accompanied by a high quality ring bound manual for easy reference. Please note the LCSI Logo is not just the well known graphics section of LOGO, but the FULL implementation. Educational establishment making a quantity order? Contact us for a possible discount.

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Herbie Briggs has just destroyed the myth that all floppy discs are created equal.

They seem equal. Until you look at the seams.

That's where equality ends.

Most companies seal their discs with a spot here, a spot there. Leaving most of each seam not sealed at all.

Sooner or later, the seams might do what comes naturally: they bulge. Warp. Pucker. Open up.

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That's sloppy. And dangerous. Because if you put a sloppy floppy into your disc drive, it can jam your drive. Ruin your drive head. Lose your data.

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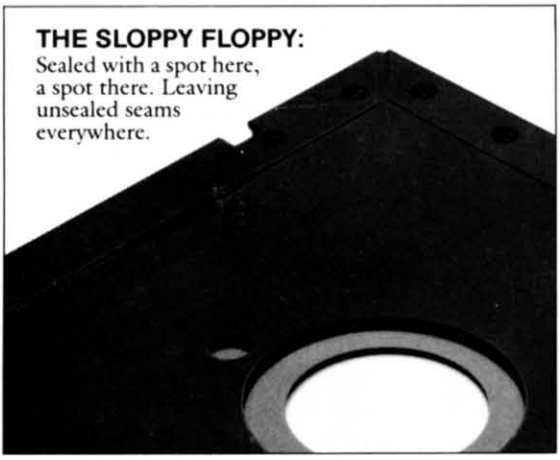

THE SLOPPY FLOPPY:
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Solid-Seam Bonding seals shut every inch of every seam of every Memorex® floppy disc. Tight as a drum. That makes the Memorex floppy stiffer. Stronger. And your data safer.

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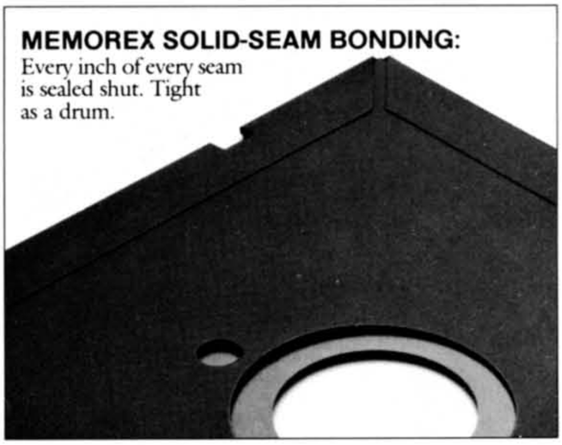

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Which proves that a Memorex floppy disc isn't equal to all the others. It's better.

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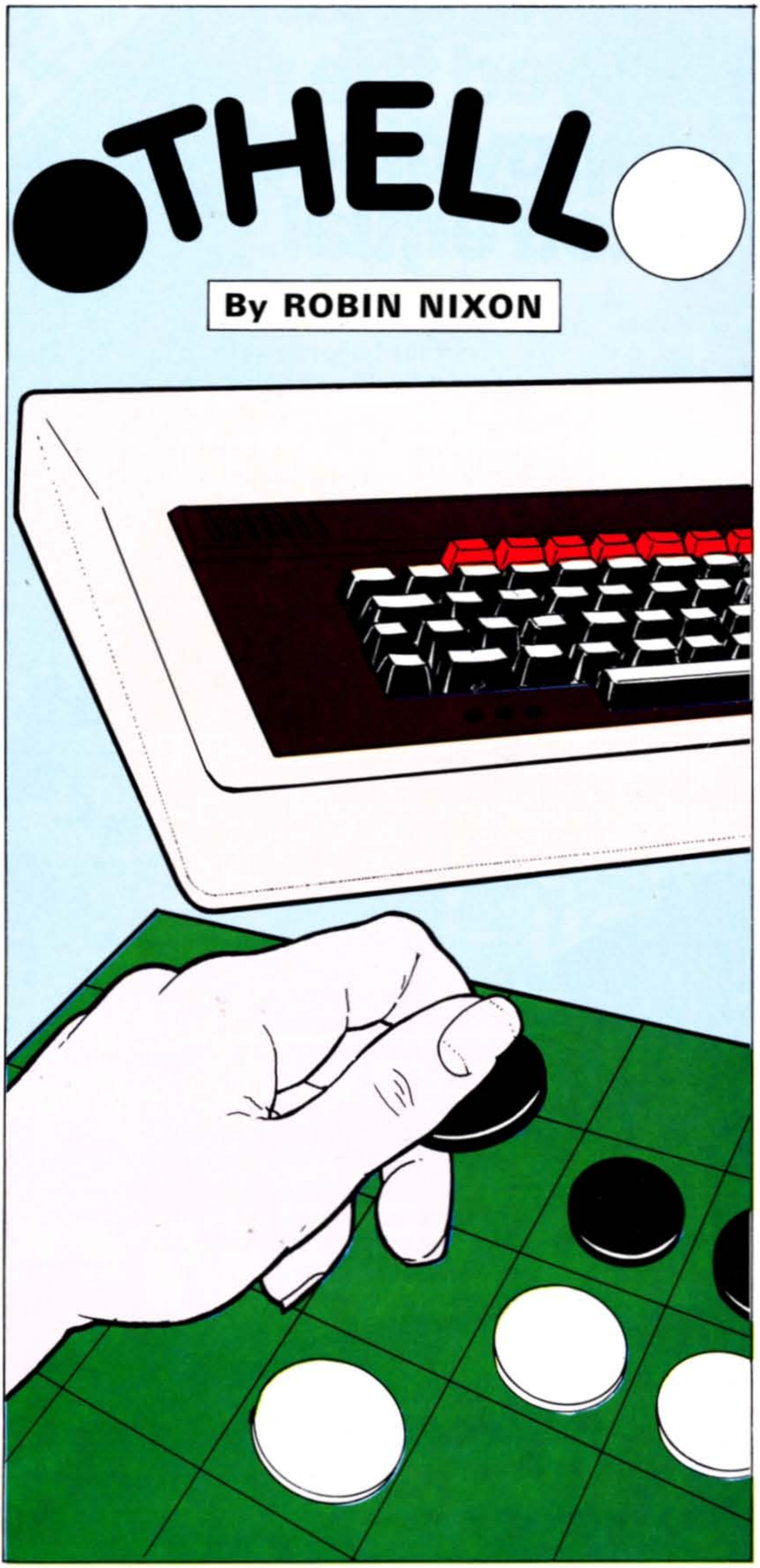
OTHELLO

By ROBIN NIXON



OTHELLO couldn't be simpler – it's a game with only one rule! Easy to learn but very hard to play well, the state of the board can change drastically after only one move.

This is, in fact, how Othello got its name. It was invented in England some time during the 19th century and was then forgotten until it was rediscovered in 1971 by Goro Hasegawa from Japan.

His father, who was a scholar of Shakespeare, remarked on how there was a similarity between the sudden reversals of situation in Shakespeare's plays and the game.

As with chess and draughts, Othello is played on an 8 × 8 board with the exception that all the squares are the same colour. The counters are double sided, usually black on one side and white on the other with each player having a different colour.

At the start of each game the players place four counters at the centre of the board. *See Figure I.* Thereafter the players take it in turns to place a counter with their own colour face up on an empty square in such a way that there is at least one counter of the opposite colour sandwiched between it and another of the player's own colour, in either a horizontal, vertical or diagonal direction.

All the opponent's sandwiched counters are then turned over to become the player's colour. It is possible for a player to sandwich the opponent's counters in several directions with one move. *See Figure IIa.*

In such a case all sandwiched counters are turned. *See Figure IIb.*

A player must always turn over at least one of the opponent's counters. If this is not possible the move is forfeited.

The game continues until the board has been filled, one or the other player has no counters left on the board or neither player can move. The winner is the one with the most counters of his or her own colour.

As the object of Othello is to end up

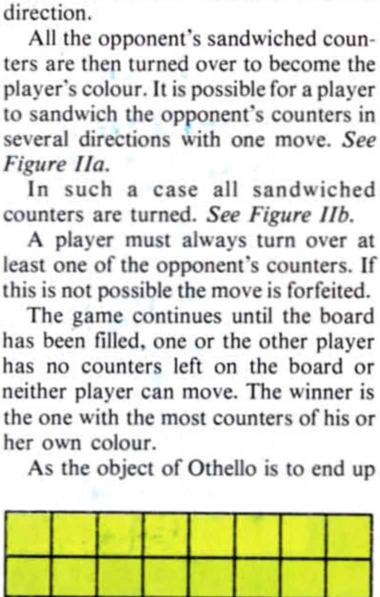


Figure I: The board at start of play

with the greatest number of counters of your own colour, it can be very tempting to try and turn over as many of your opponent's pieces as possible right from the start. However this can be very dangerous because during the opening and middle game the more counters you have and the less your opponent has, the more options are left open to your opponent. *See Figure III.*

After a few games you soon realise that the state of the board can completely change during the last eight or so moves. It therefore becomes apparent that certain squares have a higher strategic value while others can be very dangerous.

The strongest positions are the corners because once gained a counter on a corner cannot be turned over and neither can counters of the same colour placed either side. *See Figure IV.* So corners can become a solid base from which to launch an offensive.

The sides are also very strong, as counters placed there can only be turned over in one direction and can be used to turn over counters of the opposite colour in three directions. *See Figures Va and Vb.*

In implementing Othello on a computer it would be possible to construct an algorithm that searched several moves ahead. However the time taken to compute each move could be several hours.

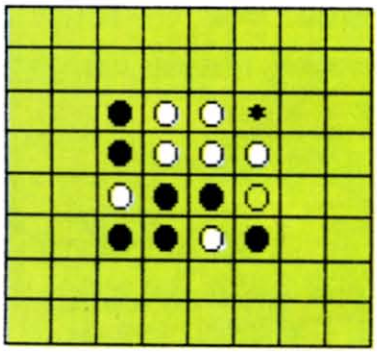


Figure IIa: Black can turn over white's counters in three directions

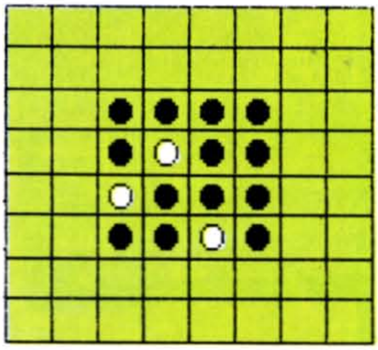


Figure IIb: The board after black's move

One way to overcome this problem is to construct a table of weightings showing which positions are stronger than others. *See Figure VI.* This table can be updated as play continues and positions that were weak become strong and vice versa.

Another strategy worth adopting is to prevent the computer from turning over too many counters at the beginning of the game, leaving a large number of possible moves available, while during the endgame choosing moves that turn over the largest number of counters.

These two strategies together enable the computer to play a reasonably advanced game taking only about a minute per move.

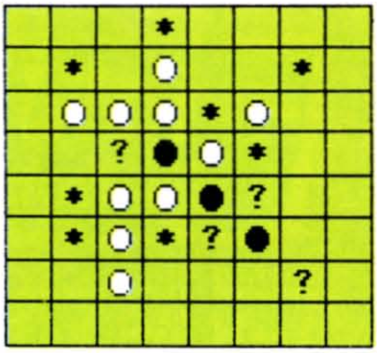


Figure III: Black has eight possible moves (*) whereas white has only four (?)

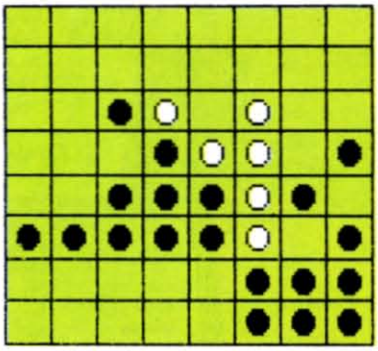


Figure IV: Black's triangle of six counters in the bottom right hand corner cannot be turned over and provides a solid base for attack

If you are an experienced Othello player you might like to try experimenting with altering the table of weights (lines 180-250) or the amount by which the weightings are adjusted when a corner move is made (PROCcorner, lines 1480-1510).

You could also write a procedure to adjust the weighting when a side move is made or, if you do not mind spending several hours on a game, alter PROCdownlevel to look two more moves ahead instead of one.

This version of Othello requires only two keys as the computer works out all

→

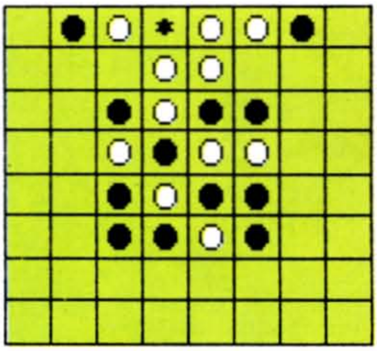


Figure Va: Counters on the side can only be turned in one direction but can turn in three

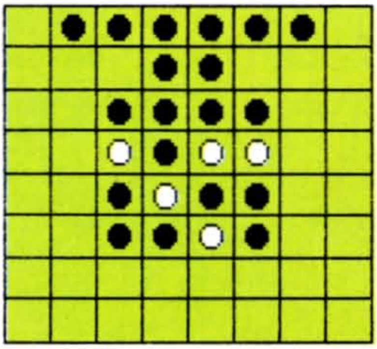


Figure Vb: The board after black's move

1500	–500	120	100	100	120	–500	1500
–500	–1000	20	10	10	20	–1000	–500
120	20	50	30	30	50	20	120
100	10	30	0	0	30	10	100
100	10	30	0	0	30	10	100
120	20	50	30	30	50	20	120
–500	–1000	20	10	10	20	–1000	–500
1500	–500	120	100	100	120	–500	1500

Figure VI: Table of weightings at start of play

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your possible moves before asking for an input.

The Space bar is used to scan between possible moves and Return selects or enters a move. This saves having to type in coordinates, helps you not to miss a move and avoids the need to check for an illegal move.

Disabled users with switches connected to the ADVAL (Analogue to Digital VALue) port can operate this game using switch 1 in place of the space bar and switch 2 in place of Return.

Anyone typing in the listing would be well advised to insert a REM statement before the ON ERRORs in lines 350 and 1610, until such time as they have removed their typing errors from the program.

Full listing starts on page 162

MAIN VARIABLES

PL%	When PL%=−1 it is the computer's go. When PL%=1 it is the player's.
PM%	Possible number of moves for the present player.
CH%	Teletext graphics colour character for the present player.
DL%	When DL%=1 procedures posplay, findplay, direction, mask and count are being used by downlevel to assess the worth of certain moves.
OK%	Flag which is set to 1 when a possible move has been found so that no further checking is done on that square.
XD%	Horizontal direction of testing for a possible move.
YD%	Vertical direction of testing for a possible move.
AD%	Equals 1 when the space bar is pressed, 2 when Return is pressed, or otherwise 0.
CT%	Delay counter controlling the rate of the flashing cursor in PROCadval.
SD%	When SD%=1 the sound is on. When, SD%=2 the sound is off.
BM%	Weighting of the computer's best move.
NM%	Number of moves made.
FH%	Adjustment made to the weighting of the positions either side of a corner once it has been taken.
TH%	Adjustment made to the weighting of the position on the diagonal next to a corner once, it has been taken.
TPM%	Temporarily stores the computer's number of possible moves while it does a look ahead.
CO%	Number of counters the computer has on the board.
CO2%	Number of counters the player has on the board.

ARRAYS

A%(8,8)	Holds the board.
B%(8,8)	Holds a copy of the board, A%(8,8), while counters are being turned.
C%(8,8)	Contains the weightings for each square.
D%(8,8)	Holds the mask, or squares that do not yet need to be tested.
E%(8,8)	Store for the board, A%(8,8), during look ahead.
F%(8,8)	Store for the mask, D%(8,8), during look ahead.
G%(8,8)	Store for the weightings, C%(8,8), during look ahead.
PM1%(60)	Contains the X coordinates of the player's possible moves.
PM2%(60)	Contains the Y coordinates of the player's possible moves.
TPM1%(60)	Temporarily stores PM1%(60) during look ahead.
TPM2%(60)	Temporarily stores PM2%(60) during look ahead.
RG%(60)	Holds all the weightings for each of the player's possible moves in a random order so that if there is a tie for the best move it will be chosen at random.
HM%(60)	During look ahead HM%(60) contains temporary adjustments to the weightings of possible moves.
A$(15)	Contains the "wait" messages.

PROCEDURES

start	Reads the data for random "wait" messages.
board	Displays the board in its current state.
posplay	Searches for all possible moves for the current player.
findplay	Used by PROCposplay to check an individual square.
direction	Used by PROCfindplay to check each of the eight possible directions.
selplay	The player's input routine. Each possible move is shown in turn when the space bar is pressed. The selected move being entered by pressing Return. The fire buttons can be used to replace space and Return.
on	Used by PROCadval to highlight a possible move.
off	As with PROCon but turns the highlight off.
turn	Turns over the opponents pieces after a move has been selected.
swapab **swapba** **swapae** **swapea** **swapdf** **swapfd** **swapcg** **swapgc**	Used by PROCcomplay to swap various arrays as certain moves are played and tested.
adval	Used by PROCselplay to flash a cursor at the present possible position of play being scanned.
keys	Used by PROCadval to scan the keyboard and the ADVAL port for a key press.
pass	Is called when either the computer or the player cannot move.
sound	Alternates between turning the sound effects on and off each time S is pressed during the players turn.
mask	Used by PROCselplay to speed up the search for possible moves. Only squares immediately next to ones that have been played on are tested for a possible move as PROCmask masks out the others.
complay	Selects the computer's move.
showplay	Displays the computer's move.
corner	Tests to see if a corner square has been selected and if so the values of the squares directly surrounding it are raised, informing the computer that it is safer to play there.
downlevel	Used by PROCcomplay after the centre 16 squares of the board have been filled to search one level deeper to find possible good moves and avoid bad ones.
count	Counts the number of computers and players pieces.
gameover	Displays the result of the game.

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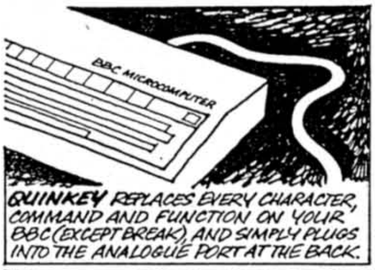
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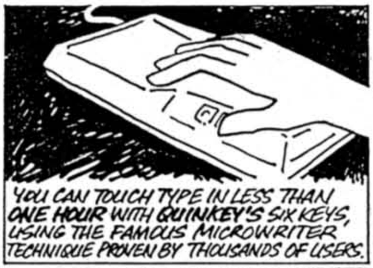
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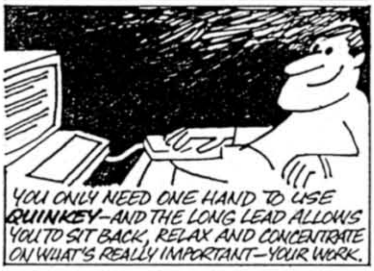
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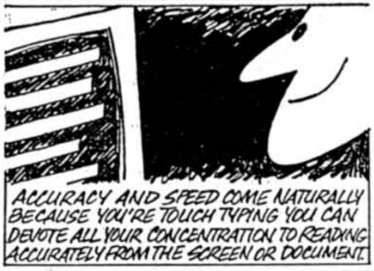
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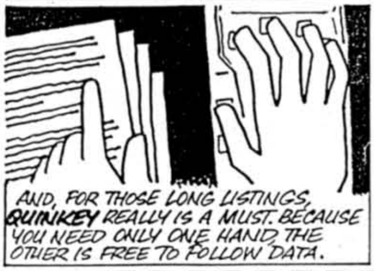
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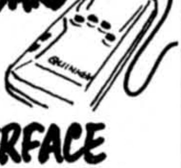

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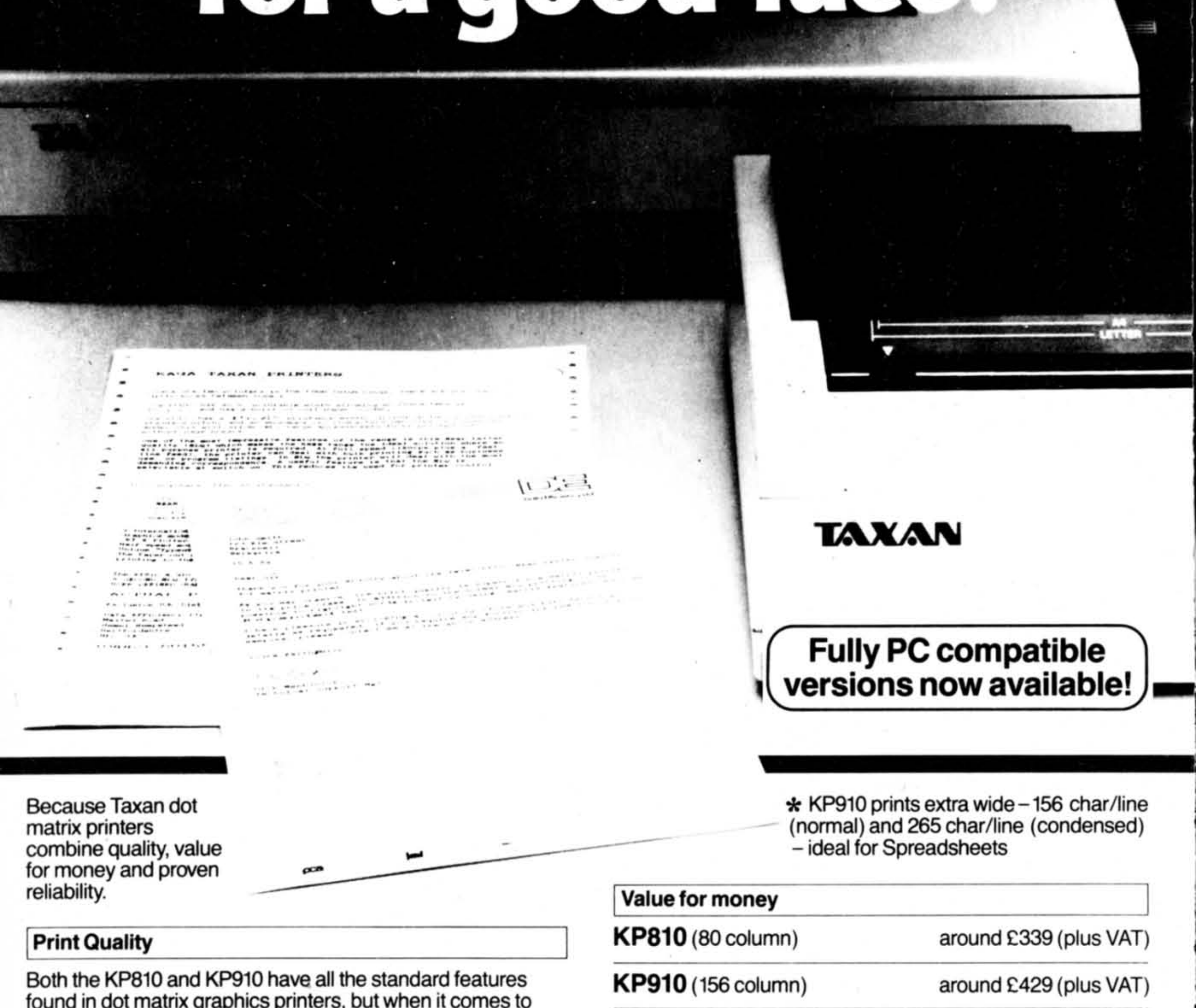

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Part 27

ONE of the more interesting aspects of living with a three-year-old is that you tend to notice a lot more about your environment.

Well, actually it's not you that notices it, but it is you that has to explain.

Take, for example, gasometers, a common-enough sight at one time, but they have gone into somewhat of a decline since North Sea gas.

One surviving gasometer is in Clitheroe, Lancashire, and its claim to fame is that it inspired this month's project. Not, you understand, intrinsically, but for what adorns it.

"Dad, what's that whizzy thing?" Just the sort of question you need when trying to back a car into the last available parking space.

Eventually "the whizzy thing" was tracked down to the anemometer on top of the gasometer.

Those of you with children will know how wearing a "favourite word" can be, so there was nothing for it but I had to make an anemometer.

A computer is very good at patiently gathering data for analysis and the British weather is very good at supplying data, so they make a natural team.

While it would not be practical to describe a complete weather station in one article, nevertheless a single sensor can be covered in the space. So from time to time I will look at the various components that could be made into a weather station.

Apart from the educational applications, there are some people for whom the wind speed is important. For example, radio amateurs with large aerial arrays often want to lower their masts when the wind strikes up.

Hang gliders, model - aircraft enthusiasts and dinghy sailors also have an interest in the wind.

It can be used as a constant source of excuses: "It's no good me tidying the leaves up in the garden – it's too windy". Or "Gosh look how windy it is, I'd better check if there is any damage to the fabric of the pub".

However, the circuit described here has wider applications for anybody wanting to measure rotation and rotational speed. For example, you could use it to monitor the movement of a motor or the speed of a shaft. You can also perform flow measurements in fluids using similar techniques.

Do you remember as a child all those books entitled "Things to do on a rainy day"? Most of them contained an anemometer.

The disappointment came in how the wind speed was read out. One of the cups was painted a different colour and you had to count the number of revolutions in a minute. Not the easiest thing to do and very "labour intensive".

Commercial anemometers work on one of two different principles: the windmill effect or the hot-wire effect.

With the hot-wire effect, a wire is heated up and the amount of cooling it experiences is proportional (among other things) to the wind speed. With the windmill effect, the wind speed is turned

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into rotational energy and that energy is then measured. This is done in many cases with the rotating shaft turning a generator. The output of the generator can then be used directly to drive a pen recorder.

We will take another approach – that of measuring the rotational speed directly by timing each revolution. Figure I shows the general arrangement.

At the heart of the system lies an optical switch. This is a small slot with a light source on one side and a photo-diode and amplifier on the other

In fact it also contains a power regulator, output stage and Schmitt trigger to give a nice clean pulse. A light beam is sent across the slot and the output changes when there is something obscuring the beam.

Therefore to make our anemometer we arrange for the shaft to obscure the beam once every revolution. The signal thus produced is then timed by the computer and with a few sums we soon have the wind speed.

Mechanical construction often poses the most difficulty for people and so I looked for a simple and reliable method. The problem is that the whole mechanism has to revolve freely.

While looking in a local model shop I found a series of brass tubes and rods under the name of K & S Metal Centre. The interesting aspect was that the rods and tubes were of such dimensions as to slot inside each other very neatly, thus eliminating the need for any precision engineering.

There are many methods of construction, but I will describe how I went about it. First, take two table-tennis balls and perform delicate surgery. Take a sharp hobby knife and carefully slice them in half along the seam. You will find that one half is bigger than the other, which sounds a little strange but there is an overlap on the seam joining the two halves together.

Then I cut some 1/16in tube into two equal lengths, in this case 5.6in. These are to form the cross arms.

The centre of each piece was pinched in a vice, so that they were reasonably flat. This allowed them to be placed at right angles and tacked in place with a soldering iron.

Next a 3in piece of 3/16in diameter solid rod was glued vertically on to the cross.

I used cyanoacrylate (super glue) which held the construction firm while I applied a liberal dollop of epoxy resin. I used the rapid-setting type and constantly rotated and inverted the brass so that the glue formed a globule around the joint. This makes for a strong encapsulated joint.

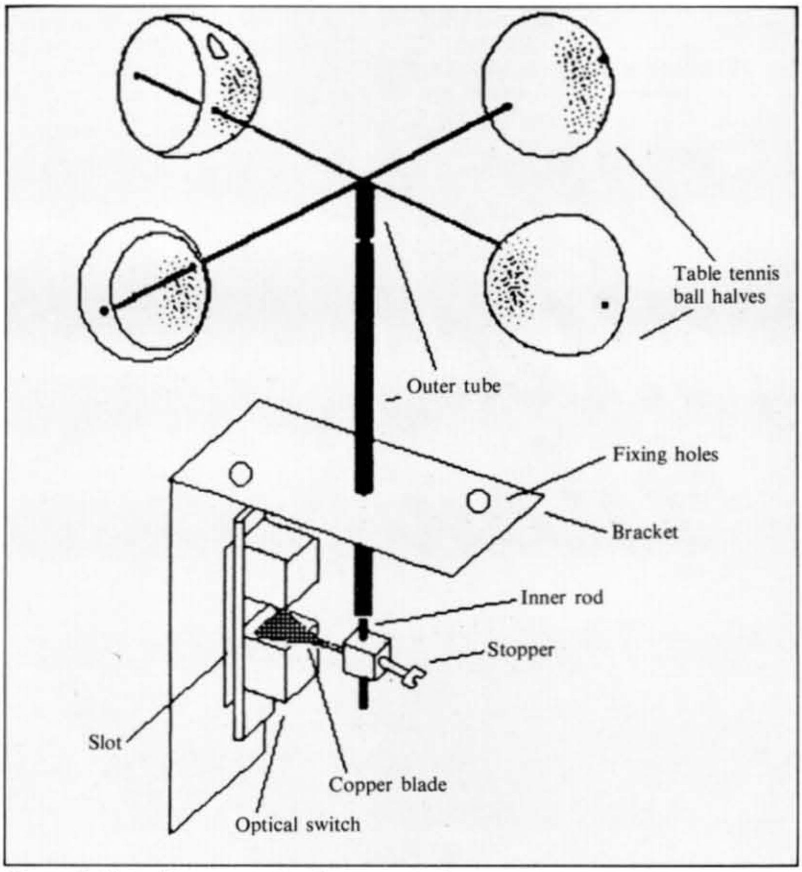


Figure I: How the anemometer is constructed

Next I took a 2in length of 1/4in diameter tube and cut 1/2in off the end. I made sure that the two surfaces were filed quite smooth as these were to form the main bearing. The small length was slid on to the rod and fixed with a small spot of glue.

Now to prepare the bracket: At one end I cut a slot to take the optical switch and drilled two holes to mount it. Then a further two fixing holes were drilled at the other end and finally a 1/8in hole to take the tube.

The bracket was then bent at right angles by holding it in a vice and hammering it over. If you use a piece of wood to hammer against, you will avoid getting marks on the bracket.

Then the tube was pushed in place and firmly fixed with a fillet of epoxy resin top and bottom. (At this stage you can drill the holes in the lid of the box you are going to mount it in.)

When the resin was firmly set, the rod was threaded in the tube. I then had to find a way to secure it and form a paddle to break the beam of the optical switch. This caused a little head-scratching until I came up with a solution.

A block with a threaded screw was taken from the screw terminal blocks used in many past projects. This fitted the rod quite well and prevented it from moving up or down. On the end there is a spike that is meant to be soldered on to a printed-circuit board. Instead I soldered a small blade made out of a small piece of copper-foil.

Copper-foil is sold in self-adhesive strips for making stained-glass objects like lampshades and terrariums. I took a small piece and bent it double over the spike and then soldered it all into place.

With a little bending and trimming, it sliced neatly through the light beam.

The sliced table-tennis balls were then fitted. I found the best way to make a hole for the tube was to take the sharp point of a hobby knife and twist it around. This produced a very good hole of the right dimensions.

When one hole had been made, I pushed the rod through until I could see it through the ball at the other side. That way I could position the second hole precisely. The two heavier half-balls were placed on the same arm to preserve the balance.

The whole unit was then mounted in a

box and sealed with rubber bath-sealer. A spot of oil on the moving parts ensured smooth action and maximum wind capture.

Just a word on cutting the brass tubes. I found it best to roll a sharp knife over the tube until there was a deep score. Then the tube could be snapped cleanly. Finally a little filing with emery cloth smoothed off the ends.

Now to the circuit. As you can see from Figure II, it is not very complicated, needing only the addition of a resistor. The circuit needs to be connected to the computer's User Port and perhaps the simplest way of doing this is to use the transition board (Body Build Pack 1) and ribbon cable (Body Build Pack 2), although a more economical method would be to use a length of ribbon cable with one socket and separate the wires out.

As some of the components are quite unusual, both the electrical and mechanical components can be obtained as Body Build Pack No. 24. See Page 76 for details.

As ever, the hardware is only half the problem. The software to drive it is shown in Listing I. It takes a sample of the wind speed at fixed time intervals and plots a histogram as well as displaying the current speed.

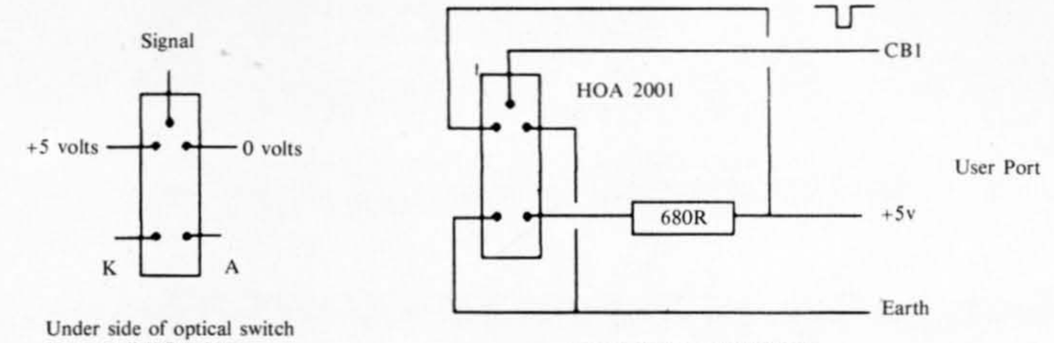
The machine code patch will continue to work when the Basic program is removed, so you can simply incorporate it into your own programs.

The idea is that each time the beam is interrupted by the paddle an interrupt causes the computer to execute the interrupt service routine located at my favourite location of &A00. This reads the interval timer to find out how long has elapsed since the last interrupt and then resets it to zero. In order to tell that a reading has been taken, memory location &8D is also set to zero.

The main Basic program initialises

```
   10 PROC PATCH
   20 MODE4
   30 PRINT"BEEB BODY BUILDING COURSE
"
   40 PRINT"ANEMOMETER"
   50 PRINT"By Mike Cook"
   60 DIM REC%(300)
   70 CUR=(PI*5.6)/63360
   80 EFF=.9
   90 PP%=30
  100 RECP%=0
  110 FOR A%=0 TO 300
  120 REC%(A%)=0
  130 NEXT
  140 FOR A%=&80 TO &8A
  150 ?A%=0
  160 NEXT
  170 REM SET UP VIA
  180 ?&FE6C=?&FE6C AND &EF
  190 ?&FE6E=&90
  200 INPUT"SAMPLE TIME IN SECONDS ",
TS%
  210 TS%=TS%*100
  220 REPEAT
  230 A%=!&80
  240 IF A%=0 THEN A%=&FFFFF
  250 SPEED=((CUR/(A%/100))*3600)/EFF
  260 IF ?&8C=&FF THEN SPEED=0 ELSE ?
&8C=&FF
  270 PRINT TAB(0,10);"SPEED IS ";INT
(SPEED+.5);" MPH";SPC(16)
  280 PP%=PP%+1
  290 IF PP% > 300 THEN PP%=0
  300 RECP%=RECP%+1
  310 IF RECP%>300 THEN RECP%=0
  320 REC%(RECP%)=INT(SPEED*20)
  330 MOVE PP%*4,0
  340 PLOT 7,PP%*4,REC%(PP%)
  350 MOVE RECP%*4,0
  360 PLOT 5,RECP%*4,REC%(RECP%)
  370 REPEAT
  380 UNTIL TIME >TS%
  390 TIME=0
  400 UNTIL FALSE
  410 DEF PROC_PATCH
  420 FOR PASS=0 TO 2 STEP 2
  430 VECT=&8D
  440 P%=&A00
  450 [
  460 OPT PASS
  470 \ INTERRUPT SERVICE ROUTINE
  480 PHA \ SAVE A
  490 TXA:PHA \ SAVE X
  500 TYA:PHA \ SAVE Y
  510 LDA &FE6D \ SEE IF IT IS US
  520  AND #&10 \ MASK OUT CB1
  530 BEQ BLK
  540 LDA &FE60 \ CLEAR IRQ FLAG
  550 LDY #0
  560 LDX #&80 \ POINT TO PLACE TO WR
ITE
  570 LDA #3
  580 JSR &FFF1 \ READ INTERVAL TIMER
  590 \ CLEAR TIMER
  600 LDY #0
  610 LDX #&85
  620 LDA #4
  630 JSR &FFF1 \ WRITE TO TIMER
  640 LDA #0
  650 STA &8C \ INDICATE NEW VALUE
  660 .BLK PLA:TAY \RECOVER Y
  670 PLA:TAX \RECOVER X
  680 PLA \ RECOVER A
  690  JMP (VECT)
  700 ]
  710 NEXT
  720 IF ?&207=&A THEN 770
  730 ?VECT=?&206
  740 ?(VECT+1)=?&207
  750 ?&206=0
  760 ?&207=&A
  770 ENDPROC
```

Listing I



Under side of optical switch
Honeywell HOA 2001

Circuit of the optical switch

Figure II: Circuit diagram

From Page 75

the VIA so that interrupts are enabled on the falling edge of CB1.

Line 230 gets the time of the last revolution. If this was zero, the variable A% is made a large number to prevent a "divide by zero" error.

Line 260 tests to see if a revolution has been recorded since we last looked at it. If it has not, then the speed gets set to zero. Without this, when the anemometer stopped, the reading would continue to be the last one taken.

The speed is then displayed and stored in an array so we can wipe out that section of the histogram later.

The speed is measured by assuming that the wind will move the anemometer at the same speed as it is travelling. This, of course will not be the case, as the efficiency of the windmill will not be perfect.

To compensate for this, we use an efficiency factor set in line 80. The circumference is calculated from the length of the diagonal arms in line 70 – this must be changed if you use any different length than the 5.6in I used.

As we want the reading in miles per hour, then note the circumference is calculated in miles, or rather a very small part of one mile.

Similarly, in line 250 the time taken in hundredths of a second is scaled up into hours.

Finally, to prevent lots of unnecessary and unwarranted digits in the result, we take the integer for display.

Now, how did I arrive at the efficiency constant set in line 80? Well I cheated and calibrated it against a commercial hot-wire anemometer. If you follow the same constructional methods this figure should be accurate enough.

However, you might like to speculate on how to calibrate it yourself. One way would be to drive along in a car on a windless day and note the speed against your car's speedometer. You would have to have some sort of portable frequency-measuring device, and someone to drive the car. You could calibrate it from observation. Look for the signs described in the Beaufort scale of wind measurement and make sure your anemometer agrees with it. You could always check the wind speed with your local weather station and arrive at the efficiency rating.

If all else fails, climb up to the top of the gasometer in Clitheroe and see what that pesky anemometer is doing. Next month back to sanity.

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DATATRACE

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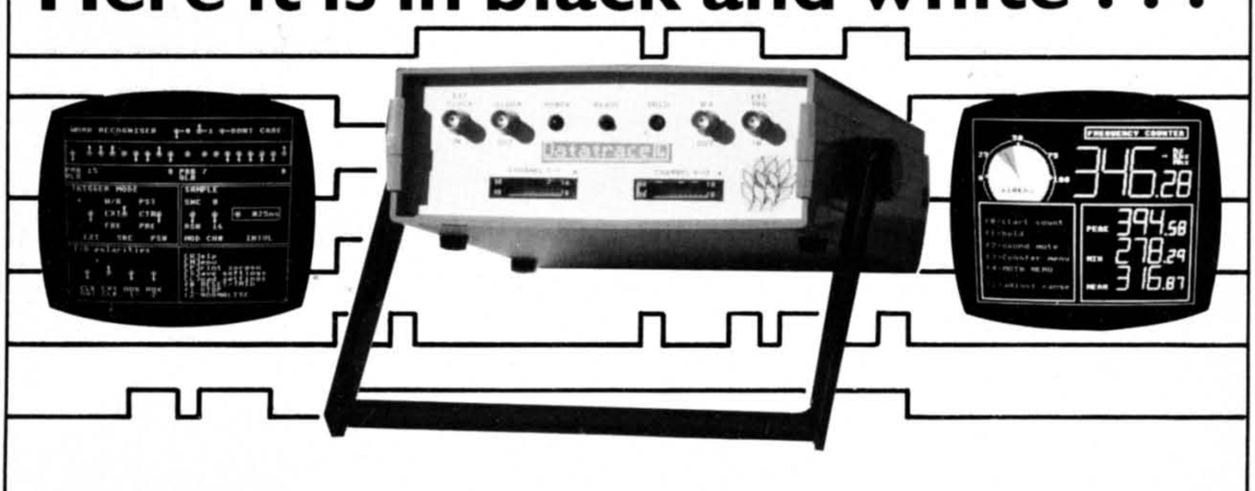

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THE BEST ARCADE GAME OF '85?

CASTLE QUEST is the latest game from Micro Power – and what a superb game it is!

It is possibly best described as a strategic arcade game with an adventure theme.

Initially it appears to be another variation of the "ladders-and-levels" type, but the first noticeable difference is that the screen scrolls as you move around. The next difference is in the obstacles you meet!

It isn't very long before you find that a sword would come in handy but unfortunately two spiders guard the only one available! You have to use two of the objects that are lying around to get it.

Getting across the Troll's bridge also involves having something with you. I don't think I'm giving anything away when I say that any adventure player worth his salt will have no trouble here! You will undoubtedly get put into prison, but there is a way out. You will also find a few very difficult jumps that are possible if your timing is right.

In addition to the usual left/right, up/down and jump keys, you can also throw objects using the cursor keys and pick up and drop things.

You also carry a back-pack which will hold up to four objects and there are keys for storing and retrieving them. One nice feature is the use of the C and V keys to scroll the screen left and right. Very handy for seeing what's coming.

Micro Power is offering £1 to anyone who can "crack it" within three months of purchasing the game. For those people who do, there is a competition. The top four scorers get a chance to win £500-worth of computer equipment.

In my opinion this is the first arcade game to successfully incorporate an adventure theme and overall is the best game of 1985 to appear so far.

I am extremely impressed and cannot recommend it too highly.

Paul Gardner

BBC 32K
A&F
ORPHEUS

This one is a winner, too

ORPHEUS, a game from those "Chuckie" People, A&F, has a distinctly Olympian air about it.

It is a seven-screen arcade game that involves guiding our man across the raging Styx – a mythological river that has overtones of dying. Heavy stuff!

As I read the inlay, I had dreams of another run-of-the-mill Frogger. In fact, though it is of a not-too-dissimilar multi-screen format, Orpheus is highly original and entertaining.

Orpheus is in his boat and must steer it across the river to collect five golden harps, which he carries back one at a time.

The current is strong, making headway in certain directions slow. In the middle of the river lurk dangerous rocks that prove rather nasty if you hit them. To make life harder, Harp Guardians swim around the river. Encounter these and it's KO time.

Things are not as bad as they seem, since you do have a trusty discus which tends to cut things off in their prime if you throw it correctly. This can be used as often as you want and, with each of your three lives, you get a Smart Bomb – killing all deviants at the touch of a key.

In later levels you get an assortment of logs, skulls (particularly troublesome characters) and of course Harp Guards to contend with.

Steering the boat takes practice, but, once mastered, highly-dexterous moves are possible. The instructions are a little shaky and the controls only appear in the program once. There's no screen snap either, which is amazing since it would be quite impressive.

The game really is fun. The graphics are good, even down to the moving oars, ripples in the river and gnashing of teeth courtesy of the Guards.

The sound effects are also excellent, with frequent tunes, bangs and crashes. However, midnight gamers will be pleased to know that they can be silenced.

In short, by original interpretation of an old theme A&F have come up with another winner for young and old alike.

Phil Tudor

Big deal ? Not really

A RECENT offering from Incentive Software is **Millionaire** which runs on both the BBC Micro and the Electron. The game is cassette-based with a caption on the sleeve encouraging punters to 'take on one of life's little challenges and become a millionaire'.

If only it were that easy.

With this unconvincing statement in mind, I proceeded to sample the efforts of authors John Bent and Steve Benfield.

The objective of Millionaire is to run a software publishing house and to make a lot of money from the sale of cassette-based software.

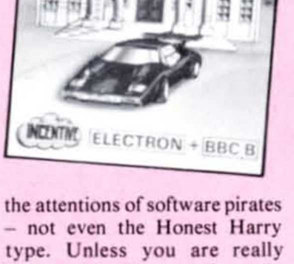
Strategically, your main problems are to ensure that you have an adequate supply of cassette tapes to sell, and a reasonable marketing initiative, though your success in this matter is somewhat random as far as I can judge from my own experiences.

Depending on your earnings, the game will upgrade or downgrade your residence, displaying an adequate pictorial representation of your abode.

The program is somewhat addictive, but it lacks the intellectual and business challenge to sustain it after a few hours or so. Most of the game relies on Mode 7 text screens, though there are also some sales graphs and pictures to liven it up a little.

There is also an option within the game to deal with a character called Honest Harry who, typically, is anything but honest. You may obtain pirated software from him if you are lucky enough not to be caught out.

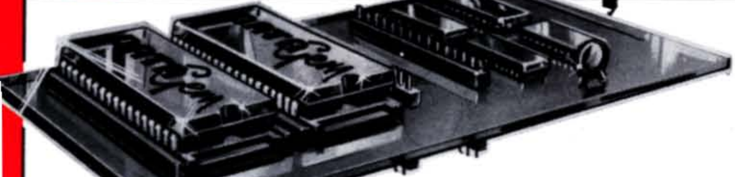
Overall, I should think it would not suffer too much from the attentions of software pirates – not even the Honest Harry type. Unless you are really interested in this sort of pseudo wheeling and dealing, it might prove a little uninspiring for those of you expecting another intellectual adventure-type challenge.



Chris Chan

GEMINI *Serious Software*

BBC MICRO



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- Press Comments:-
- "Datagem provides many of the spreadsheet facilities of an item like Lotus 1-2-3........ Combined with a word-processor it forms the basis of a very competent small business system".
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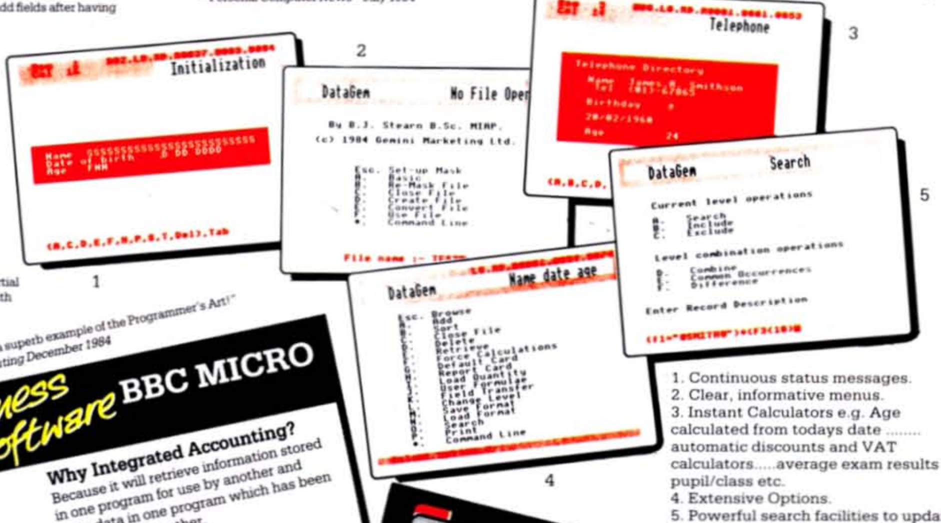

```
Initialization
Name          SSSSSSSSSSSSSSSSSSSSSSSS
Date of birth          D DD DDDD
Age           FNN
```

```
DataGem                    No File Open
By B.J. Stearn B.Sc. MIAP.
(c) 1984 Gemini Marketing Ltd.
Esc. Set-up Mask
     Basic
     Re-Mask File
     Close File
     Create File
     Convert File
     Use File
 *.  Command Line
File name :-
```

```
Telephone
Telephone Directory
Name   James.R. Smithson
Tel    (01)-67865
Birthday
20/02/1960
Age        24
```

```
DataGem              Name date age
Esc. Browse
     Add
     Sort
     Close File
     Delete
     Retrieve
     Force Calculations
     Default Card
     Report Card
     Load Quantity
     User Formulae
     Field Transfer
     Change Level
     Save Format
     Load Format
     Search
     Print
 *.  Command Line
```

```
DataGem                    Search
Current level operations
A.  Search
B:  Include
C:  Exclude
Level combination operations
D:  Combine
E:  Common Occurrences
F:  Difference
Enter Record Description
```

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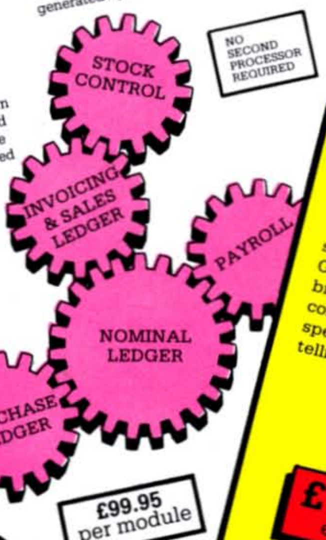

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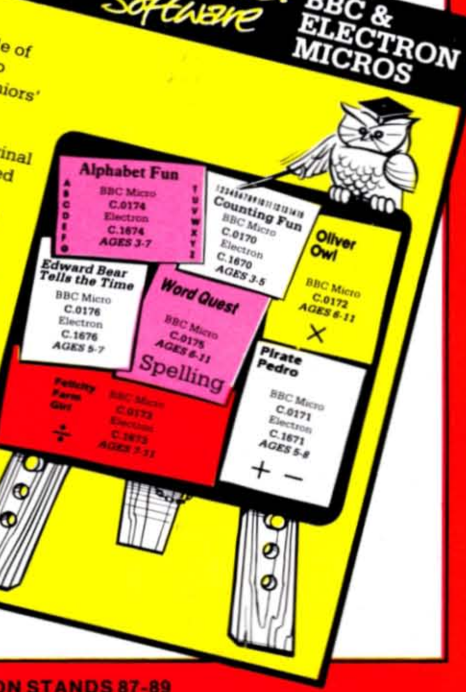

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Cashing in for tots

BBC
32K
EDUCATIONAL SOFTWARE
TYNESOFT
WINDOW
SHOPPING
6-10 yrs.

SOME programs arrive for review at just the right time and **Window Shopping** came just as I needed reinforcement work for some children in money manipulation.

I was doubly delighted to find the tape was also quite a good one with clear simple instructions explaining an equally clear and simple idea.

By "window shopping", a child can gain valuable practice in using money.

Buy Two and Buy Three show a series of nine objects, all drawn rather well with some cute animation. Each object is labelled with a price between 1p and 10p.

A sum of money is shown, and the child has to select which two or three objects will total that exact amount. They are easily selected with the spacebar moving the cursor around, and the Return key used to select an item.

A little tune plays if the items are correctly chosen, while an incorrect choice brings a request to try again.

Choose One appears in two levels with the idea being that the child has to decide which object to choose so that, for instance, three of them cost 24p.

This gives valuable practice in division or multiplication. The different levels have differing parameters, so that all tables from two to nine are practised.

Change One and Change Two deal with the change received from 20p or 50p. The amount of change is given, and the child has to decide which two objects could then have been bought. This was quite challenging, and well worthwhile.

The same window display theme is shown throughout, although the objects themselves vary. Again, the child selects the items in the same manner so that minimum attention is needed from the teacher.

Another feature I enjoyed was that there was no time limit imposed which allowed a group of children to discuss when necessary, or perhaps to use plastic coins to try out their answers.

Sound can mercifully be turned off, Esc takes the program back to the menu, but unfortunately Break is not dealt with. Surely this should be standard policy in the classroom?

It isn't the best educational program I've seen, but a very creditable attempt from Tynesoft, a new house fronted by a primary school teacher.

It will certainly be used at appropriate times with my children and it could prove an enjoyable and entertaining way to learn at home. Children who learn by enjoying themselves tend to want to return to try again. My children seem to be keen enough.

Phil Tayler

Drawing comes easier

AT last in Paean Systems' **Micro Artist** I have come across a joystick driven drawing package that is simple to use and very versatile.

This program makes good use of Mode 2 and enables one to swiftly draw and save/load lots of items using the rubber banded, dotted/solid lines and the usual filled/unfilled figures – triangle/square/circle.

But this time the circle is a special – the routine supplied is for ellipses!

The cursor expands into a rectangle whose horizontal/vertical sides are related to movements of the joystick. The ellipse is drawn tangentially inside this rectangle. To draw a circle one manipulates the rectangle into a square.

However it is in the other routines that the fun occurs. On chaining the program one is presented with a nicely framed

→

QUICK RUNS

A first look at some of the latest releases

The Micro At Work (1): *A two-program cassette pack aimed at the 9-13 age group coinciding with the ITV schools series. The first simulates the micro used by a travel agent and tour operator, with decisions to be made about planning and costs. Air Traffic Control allows the user to face a simulated emergency which necessitates landing a number of aircraft at diversion airports.* (Granada TV)

★ ★ ★

The Micro At Work (2): *Also aimed at the 9-13 age group, this alternative three-program cassette pack features Robot, a suite of four programs which allow the student to move a robot on screen; Train, four programs which simulate automated marshalling; and Routes/Postman, two closely-related programs introducing the pupil to the concept of simple routeing.* (Granada TV)

★ ★ ★

Picture Logic: *A logo-type package which, using everyday English commands, creates a myriad of geometric patterns and pictures. In addition to the software, the package contains a 40-page Challenge Book to lead you through problems, and a 16-page User Manual to introduce you to the various commands.* (Addison Wesley)

★ ★ ★

Quelle Tête or Kopfjäger: *Separate French or German equivalents of the same package which are two program educational disc packs aimed at first and second year students. Both programs extend the user's vocabulary by graphic and amusing illustrations. Quelle tête/Kopfjäger invite you to choose facial features to practise adjectives, and then draw the result. Jeu des ménages/Umziehen allow the user to arrange furniture to practise spelling, gender and prepositions.* (Cambridge)

★ ★ ★

Tesselations: *A disc package which allows the user to draw tesselating shapes automatically providing symmetry in any of 17 possible symmetry groups. A full colour palette encourages you to design your own tiles, and the micro will then tesselate the pattern and fit the tiles together. A library disc is also provided showing examples from Chinese, Islamic, Celtic and other cultures.* (Cambridge)

★ ★ ★

Combat Lynx: *In this battle simulation, you fly a Westland helicopter on a series of sorties in support of your ground forces. Select from a choice of anti-tank, anti-aircraft and strafing missiles, or carry cannon, machine guns, mines or personnel. You may scan the battlefield relief map for reports and then fly to the coordinates over a 3D colour landscape.* (Durell)

★ ★ ★

Corpuscle: *Journey into the 3D labyrinth of the human arterial system armed with your laser. Take control of your body defences in an attempt to defeat the invading colonies of bacteria. Survival is your objective in a never-ending struggle against disease in this real-time simulation.* (Micrograf)

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screen whose left and right sides are menus with colours, symbols or initials in boxes indicating the goodies on offer.

You merely place the cursor into the relevant box, pressing Fire to select a colour. After that it is off to the screen, pressing Fire when the right location is reached.

A well written user guide explains these items but they are so easily learned – even by me – that you only need it a couple of times.

There are a given number of pre-defined characters you can select and place around the screen or you can easily define your own, replacing those pre-defined ones not needed.

Text can be quickly and simply inserted and the size and proportions of the letters defined by the changeable rectangle cursor.

Very valuable are the rotate and reflect routines. The command is selected, an area is defined by use of the rectangular cursor and the point about which rotation or reflection takes place is defined.

An appropriate angle is typed in if needed and this area is reasonably faithfully duplicated as required in the same or different colours. The drawback here is the jaggy effect of sloping lines.

The only other drawback is that it comes on tape and uses sufficient memory to make it difficult to use with disc unless I make my Solidisk Sideways RAM supplement the DFS with its STLE00 program.

This means that for most users tape is the only input medium. This is always tedious to reload when a crash occurs – mind you, it is pretty impossible design any program that a five-thumbs like me will not somehow provoke into a fit of the sulks.

Terry Hallard

O level revision

ALGEBRA and **Trigonometry** are two cassettes from Cheshire Cat containing maths programs covering O Level revision.

Algebra is in three parts and covers expansions, factorisation, equations, change of subject of formula, variation, indices, surds and fractions.

Each section is split into a number of topics. For instance on choosing equations, the user is given the choice of tuition and questions covering linear, quadratics and fractional equations. In fact a very wide range of topics is covered in each section.

The progam is menu driven and one can step backwards or forwards through it – a useful facility when using the tuition sections.

The program first demonstrates how to solve a number of problems covering the chosen topic, then displays a self test to be worked out on paper. This is followed by the answers and if the user finds difficulty understanding how a solution was obtained the working can be displayed.

In the tuition mode, emphasis is given to important teaching points by displaying each new stage of the calculation in a flashing mode.

Trigonometry is designed in a similar way to that of Algebra except that graphics are used to good effect in the tuition mode to give excellent examples of how various trigonometrical rules can be applied to real problems.

Topics covered by Trigonometry are basic trigonometry, angles of elevation and depression, solution of triangles, bearings, sine and cosine rules.

All the programs give excellent tuition and screen displays are well set out but rather monotonous. No use is made of contrasting background colours to emphasise teaching points and apart from using different background colours for tuition, question and answer modes, very litle attempt is made to use the excellent colour facilities available on the BBC Micro.

As far as I could ascertain, answers were accurate and layout of calculations was shown in clear and easily understood stages. The programs contain very useful revision material and would be a boon to any student requiring self programming revision exercises or visual reminders of how particular problems are tackled.

However, my one big reservation is that there is no provision for any alteration of data within the programs and because of this they may be of limited use in schools. Having said this, the complexity of the programs in respect of the tuition modes make changing data extremely difficult to allow for.

John Daddy

Polished miner

32K BBC MICRO

AFTER Ledgeman arrives home from the village auction, he decides to investigate his bargain of the day – a Victorian bureau. Dusting off the cobwebs, he finds a map telling of great treasure in a hidden cave. It also warns of the strange and perilous guardians of the cave.

Gripping his trusty brolly, Ledgie sets off ... only to find himself in a Manic Miner variant.

However, as far as variations go, **Ledgeman,** by Software Projects is quite interesting. As the program adopts the usual multi-screen format, our hero has to jump around the screen picking up "precious stones" which are usually positioned in suitably awkward places.

The walkways can be solid or they might disintegrate as you walk on them. So far so good. But the difference is that there are periodic meteor storms that whizz across the screen and smash sections of the walkway.

So if you hang about too long on certain screens you're liable to have goodness knows what lobbed at you.

The graphics are simpler and more chunky than the original, though this could well increase its appeal to younger "gamers". There are seven entirely different screens, after which the nasties get nastier by shooting at you.

The animation is good with a nice little man! Having said this, surely it's not too much to ask for a bit of leg movement during climbing and possibly jumping. The sound is quite clever – with an optional tune and effects.

As a game, its level is set about right. It's not too tricky – but the barrels, ghosties and meteors certainly keep you on your toes.

The instructions are adequate, though the actual blurb spends most of the time on the scenario.

Joysticks can be used, though the keyboard provides very comprehensive control – freeze, unfreeze, abort and skip to next level are examples.

To summarise, it's a simpler version of Manic Miner with polished graphics and sound effects.

Philip Tudor

Sharp shooters needed

A LOT of thought seems to have gone into the development of **Ultron,** a "shoot-'em-down" arcade game from Viper Software.

As you may guess from the name, someone has obviously decided to try for the ultimate Space Invaders game. A difficult task, but they haven't done too bad a job at all.

The music played while the game is loading is particularly striking. Viper have composed one of those catchy tunes that pound round your brain and won't go away.

The graphics are equally impressive and start as the instructions appear on screen.

Ultron isn't content with just four or five different waves of aliens. There are 12! Some are easy. Others, like the swarm of vibrating purple pods, are as easy to get past as a Liverpool nightclub bouncer with a toothache.

If that isn't enough, after every fourth wave a swarm of asteroids appears on screen and has to be negotiated, after which you dock your laser base with a mother-ship for a nice points bonus.

Also you can't just sit there blasting away and trusting to luck. Every shot that misses counts as "photon wastage", and is measured on a scale at the bottom of the screen.

If this gets too high it's goodbye laser base, so a bit of sharp-shooting is called for.

The game also has all the extras you could want. Sound is good, and can be switched off if required. You can freeze-frame if you get in a tight corner, or if the phone rings.

The game has a demo mode to show you the type of aliens to expect and can be played by joystick, though the controls are so easy that it is simple to play using the computer keyboard.

My overall opinion? Well, not quite the ultimate, but very good. If you like shooting down swarms of marauding aliens, then buy it. You won't be disappointed.

James Bibby

Here's value for musical money

OF the packages on the market which turn the BBC Micro into a musical instrument, many are inferior to FSoft's **Music Maker,** and none that I know of can compete with it in value for money.

For £9 you get a smart program that gives you many of the facilities found on expensive synthesisers and you don't have to be Mozart or Mike Oldfield to get bags of fun out of it.

The package comes on cassette and is built round two modules: The Sound and The Player.

The Sound allows you to alter the volume and pitch of sound shapes which are displayed as graphs, with active areas highlighted for easy editing.

Using the amplitude graph you can regulate the four phases associated with volume output – attack, sustain, decay and release. The pitch graph shows frequency modulation, and by manipulating various step-parameters you can produce vibrato, glissando, trills and other more exotic effects. Sixteen envelopes can be held in RAM for instant recall and groups of 16 saved on tape.

The sound shapes can be heard by playing up to three notes simultaneously on the BBC keyboard (it's worth mentioning that many synthesisers can only handle one note at a time).

The range is four octaves and eight keys are set aside for percussive noises. The BBC Micro's audio output gives adequate results, but they can be dramatically improved if your micro is linked to an external amplifier and speaker.

The second module, The Player, is a sequencer – a device for reproducing sequences of pre-set notes.

It offers all the playing and output facilities of The Sound, but also has a user-definable split keyboard, so that two different envelopes can be accessed by separate sets of keys.

Up to three lines of music can be recorded in real time and mistakes corrected if necessary with a Line Editor before saving to tape.

Sequences can be one-shot or repetitive and can be used in conjunction with a fairly versatile percussion generator.

The Player display consists of a status page and a pair of staves on which the notes appear as you play them. They scroll across the screen making fascinating patterns but serve little practical purpose.

Time values are limited to minims and crotchets, there are no flats or naturals and leger lines are missing. However this shortcoming has to be set against some genuinely useful secondary functions, such as a metronome and a tuning facility.

The whole package is quite friendly. Commands are entered with various combinations of the function keys, labelled on the strip provided.

Error-trapping is efficient and on-screen messages are clear. The comprehensive documentation takes you step by step through the program and the system tape contains a demonstration sequence and some ready-made envelopes to start you off.

Competition in the field of music software is certainly hotting up. Music Maker is on the crest of a new wave of increasingly powerful and well-designed packages which don't cost the earth.

Gabriel Jacobs

Speedy 3D Maze

INDUSTRIAL espionage is the name of the game when playing **Maze** from Acornsoft. As a secret agent your mission is to penetrate the security system of a rival company and acquire valuable information.

The security system consists of a series of mazes, each on a different floor of a multi-storey building. The only route between these floors is via a computer-controlled lift.

The lift itself is easy enough to find as this is where you first enter the maze. Unfortunately it's deactivated as you leave – the only way it can be opened again is by using a special electronic security key.

To cut a long story short, the key is inside an indestructible box which can only be opened by placing three coloured security tags into the box – these tags being placed randomly around the maze.

As if this wasn't enough to cope with you will find that the maze is patrolled by robot guards who are programmed to shoot on sight. You are also armed, but are carrying only three bullets.

It is therefore necessary to find at least one of the several power points situated around the maze. These will enable you to recharge your weapon to give another three shots.

As an aid to navigation you are equipped with an electronic compass. This automatically maps the areas of the maze you have visited, the position of the lift, and most importantly the positions of the robot guards.

Technically the program is well written, the 3D maze being produced with incredible speed as you move around. Unfortunately technical excellence is not always sufficient to make a good game.

I found it a little tedious – but should maze games be your forte then you won't find a better one than this. **Jon Revis**

Doesn't really shape up

COLOURS and Shapes from 1A Business Computing is described as "an educational program for use as a logic extension activity". Overall the doubts this caused were not altogether misplaced.

The basic aim of it is to help 3 to 8 year olds with both colour and shape recognition and ordering different objects into logical arrangements.

There are five different levels of difficulty, the basic one being Margin Colours. On this level a four by four grid is displayed with four coloured squares to the left, corresponding to the row colours.

The micro puts four different coloured objects in correct rows on the grid. The user has to place the next coloured object – displayed at the bottom of the screen – on to the grid by entering the two digit number of the appropriate square.

All the other levels carry on from this. Level 2 is Margin Colours and Shapes in which a row of shapes is displayed below a grid so that each coloured shape has only one correct destination square.

In Level 3 – Random Colours – the user has to correctly identify the colour of each row to fill in the exterior colour squares

Level 4 – Geometric Shapes – uses geometric shapes instead of the other shapes, and Level 5 – Words, Colours and shapes – is

→

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the most hair-raising of all.

The idea is that a question such as 'Which number square does the purple ladder go in?' is displayed, with the words 'purple ladder' or whatever, in the appropriate colour.

But this software writer has blue mixed up with purple, no doubt causing endless confusion to the innocent five-year-olds using the program.

Any child needing practice in this sort of area would probably be better equipped with a tray of plastic shapes and different coloured boxes, than being confronted with this rather unsatisfactory package.

Jane Jackson

Children's delight

BANJAX is an arcade adventure, from Robico Software, that contains some of the best Mode 1 graphics I have ever seen.

You are Banjax the bear and your task is to collect the treasure that lies scattered around the game's 240 locations.

Along your way you will find various "nasties" who will kill you if they can.

Also you will find gargoyles, who will block but not harm you and guards who will not let you pass until you have found enough treasure.

Some of the nasties can be avoided, but others effectively block your progress. Since all but the positioning of the guards is random, these last can be overcome by moving to another screen and then back again until the way is clear.

You have four lives and pressing the Return key "memorises" locations, so that if you are killed you are reincarnated to these locations rather than back to the beginning of the game.

Your explorations of the game should see you collect all the treasure (remember to find something to put it in!), then head for the temple in the upper screens. Here you will find a key that opens the gates you start the game at.

A definite must for the kids that I recommend highly.

Paul Gardner

Take the hot seat

MIRRORSOFT
IVAN BERG SOFTWARE
BBC MASTERMIND and
BBC MASTERMIND QUIZMASTER

BBC Mastermind is an excellently packaged set which contains two cassettes and a fairly good booklet, and is compatible with both the Electron and the BBC Micros.

As the title obviously implies, it is an implementation of the BBC TV series which people either seem to love or to hate. Even if you are one of the latter, I've started this review so I'll finish . . .

The awful theme is there, as are the famous words which introduce each competitor. A specialist subject is asked for, which is fine so long as you are into either sport and games or TV and films!

Otherwise it is necessary to buy another cassette – BBC Mastermind Quizmaster – which will allow a series of questions on another specialist subject to be written and stored for future use.

A problem would appear to be that the question files couldn't really be considered to be very fair, as they are bound to differ in length, complexity and difficulty. Maybe that wouldn't matter too much if the competitive element wasn't important, such as at a friendly party, but then I would be inclined to use one of the other excellent quizzes produced by Ivan Berg, such as the superb Royal Quiz.

The other option is to wait for the promised question files to be released, which will presumably widen the range of subjects available.

However, returning to the cassettes as they are at present, the implementation is quite superb. It remains very faithful to the original and you can almost imagine Magnus speaking the words that appear on screen.

Phil Tayler

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Transistors Revenge (Softspot)	June 1984
Uncle Claude (Alligata)	Nov 1984
Valley of the Kings (MP)	Apr 1985
Vampire Castle (Micrograf)	Aug 1984
Vectors (Salamander)	Dec 1984
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Twickenham. Twickenham Computer Centre, 72 Heath Road. Tel: 01-892 7896.
Uxbridge. JKL Computers, 7 Windsor Street. Tel: 0895 51815.

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Norwich. Adams, 125-129 King Street. Tel: 0603 22129.
Thetford. Thetford CB & Micros, 21 Guildhall Street. Tel: 0842 61645.

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Newark. Jacobs Computers, 13 Middle Gate. Tel: 0636 72594.
Nottingham. Telstar, 280 Huntingdon Street. Tel: 0602 505585.
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Worksop. Computer Grafix, 32 Bridge Street. Tel: 0909 472248.

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Bury St. Edmunds. Boots, 11-13 Cornhill. Tel: 0284 701516.
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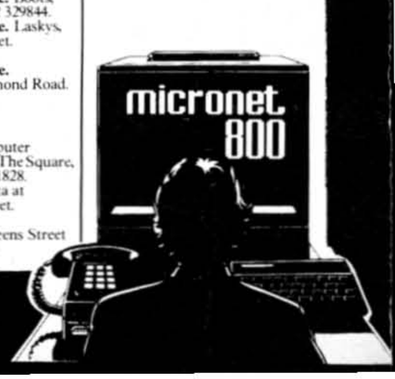

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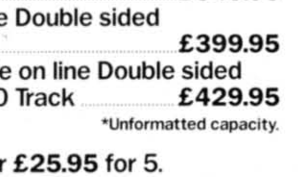

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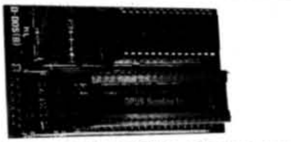

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```
   10 REM Multi-coloured
   20 REM Character definer
   30 REM By Kevin Edwards
   40 ON ERROR GOTO 1440
   50 *FX4,1
   60 base%=&B00
   70 DIM patt%(1,15)
   80 MODE 2
   90 VDU 23,255,255,255,255,255,255,
255,255,255
  100 FOR loop1%=0 TO 1
  110 FOR loop2%=0 TO 15
  120 READ patt%(loop1%,loop2%)
  130 NEXT:NEXT
  140 PRINT'''"Load old file (Y/N)"
  150 A$=GET$
  160 IF A$="Y" OR A$="y" THEN PROClo
ad:GOTO 260
  170 CLS:just_loadsav=FALSE:*FX15
  180 INPUT'''"Enter Width 1-8 ",widt
h%
  190 IF width%<1 OR width%>8 THEN VD
U7:GOTO 180
  200 CLS
  210 PRINT'''"Enter height"
  220 INPUT'"8,16 or 24 ",height%
  230 IF height%<>8 AND height%<>16 A
ND height%<>24 THEN VDU7:GOTO 210
  240 FOR L%=0 TO width%*2*height%-1
  250 base%?L%=0:NEXT
  260 CLS
  270 FOR L%=0 TO 15
  280 VDU 31,L%,29:COLOUR L%:VDU 255
  290 NEXT
  300 FOR L%=0 TO width%*2-1
  310 VDU 31,L%+1,1
  320 IF (L% MOD 8)=0 COLOUR 1 ELSE C
OLOUR 7
  330 PRINT;CHR$(65+L%)
  340 NEXT
  350 FOR L%=0 TO height%-1
  360 VDU 31,0,L%+2
  370 IF (L% MOD 8)=0 COLOUR 1 ELSE C
OLOUR 7
  380 PRINT;CHR$(65+L%)
  390 NEXT
  400 IF just_loadsav PROCscreen up:j
ust loadsav=FALSE
  410 COLOUR 7
  420 X1%=0:Y1%=0:X2%=1
  430 VDU 31,X2%,30,94
  440 VDU 31,X1%+1,Y1%+2
  450 RX%=0:RY%=0
  460 FOR delay%=1 TO 450:NEXT
  470 IF INKEY(-119) PROCclear
  480 IF INKEY(-115) PROCdisplay
  490 IF INKEY(-33) RC%=-1:PROCcolour
  500 IF INKEY(-114) RC%=1:PROCcolour
  510 IF INKEY(-87) PROCload:GOTO 260
  520 IF INKEY(-82) PROCsave:GOTO 260
  530 IF INKEY(-23) COLOUR 7:GOTO 170
  540 IF INKEY(-26) RX%=-1
  550 IF INKEY(-122) RX%=1
  560 IF INKEY(-58) RY%=-1
  570 IF INKEY(-42) RY%=1
  580 IF INKEY(-99) THEN COLOUR X2%:V
DU 255,8:PROCchange
  590 X1%=(X1%+RX%) MOD (width%*2)
  600 IF X1%=-1 THEN X1%=width%*2-1
  610 Y1%=(Y1%+RY%) MOD height%
  620 IF Y1%=-1 THEN Y1%=height%-1
  630 GOTO 440
  640 DEFPROCchange
  650 old=?(INT(X1%/2)*height%+Y1%+ba
se%)
  660 IF X1% AND 1 new=(old AND &AA)
OR patt%(1,X2%) ELSE new=(old AND &55
) OR patt%(0,X2%)
  670 ?(INT(X1%/2)*height%+Y1%+base%)
=new
  680 ENDPROC
  690 DEFPROCget_col
  700 byte%=?(INT(M%/2)*height%+L%+ba
se%)
  710 FOR L1%=0 TO 15
  720 IF (byte% AND &AA)=patt%(0,L1%)
 left%=L1%
  730 IF (byte% AND &55)=patt%(1,L1%)
 right%=L1%
  740 NEXT
  750 ENDPROC
  760 DEFPROCcolour
  770 COLOUR 7
  780 VDU 31,X2%,30,32
  790 X2%=X2%+RC%
  800 IF X2%=16 THEN X2%=0
  810 IF X2%=-1 THEN X2%=15
  820 VDU 31,X2%,30,94
  830 VDU 31,X1%+1,Y1%+2
  840 ENDPROC
  850 DEFPROCclear
  860 COLOUR X2%
  870 FOR y%=2 TO height%+1
  880 VDU 31,1,y%
  890 PRINTSTRING$(width%*2,CHR$(255)
)
  900 NEXT
  910 VDU 31,X1%+1,Y1%+2
  920 byte%=patt%(0,X2%)+patt%(1,X2%)
  930 FOR loop%=0 TO 2*width%*height%
-1
  940 loop%?base%=byte%
  950 NEXT
  960 ENDPROC
  970 DEFPROCdisplay
  980 FOR loop1%=0 TO height%/8-1
  990 FOR loop2%=0 TO width%-1
 1000 FOR loop3%=0 TO 7
 1010 ?(loop1%*&280+&4130+loop3%+(loo
p2%*8))=?(loop2%*height%+(loop1%*8)+b
ase%+loop3%)
 1020 NEXT:NEXT:NEXT
 1030 ENDPROC
 1040 DEFPROCsave
 1050 CLS
 1060 COLOUR 7
 1070 PRINT'''"Do you want to save"
 1080 PRINT'''"just the graphic"
 1090 PRINT'''"data (Y/N) ? ";
 1100 *FX15
 1110 A$=GET$
 1120 IF A$="Y" OR A$="y" THEN data_o
nly=TRUE:PRINT"Y" ELSE data_only=FALS
E:PRINT"N"
 1130 INPUT'''"File name ",file$
 1140 IF file$="" OR LEN(file$)>7 THE
N VDU7:GOTO 1210
 1150 X=OPENOUT(file$)
 1160 IF NOT data_only PRINT#X,width%
,height%
 1170 FOR L%=0 TO height%*width%-1
 1180 BPUT#X,base%?L%
 1190 NEXT
 1200 CLOSE#X:just_loadsav=TRUE
 1210 ENDPROC
 1220 DEFPROCload
 1230 CLS:*FX15
 1240 COLOUR 7
 1250 INPUT'''"File name ",file$
 1260 IF file$="" OR LEN(file$)>7 THE
N VDU7:GOTO 1330
 1270 X=OPENIN(file$)
 1280 INPUT#X,width%,height%
 1290 FOR L%=0 TO height%*width%-1
 1300 base%?L%=BGET#X
 1310 NEXT
 1320 CLOSE#X:just_loadsav=TRUE
 1330 ENDPROC
 1340 DEFPROCscreen_up
 1350 FOR L%=0 TO height%-1
 1360 FOR M%=0 TO width%*2-1 STEP 2
 1370 PROCget_col
 1380 COLOUR left%:VDU 31,M%+1,L%+2,2
55
 1390 COLOUR right%:VDU 255
 1400 NEXT:NEXT
 1410 ENDPROC
 1420 DATA0,2,8,10,32,34,40,42,128,13
0,136,138,160,162,168,170
 1430 DATA0,1,4,5,16,17,20,21,64,65,6
8,69,80,81,84,85
 1440 MODE 7
 1450 CLOSE#0
 1460 PRINT''':REPORT:PRINT" at line
"ERL
 1470 *FX4
 1480 END
```

Program I

It's a sort of multicoloured swap shop

Part five

HOW TO WRITE MACHINE CODE GAMES

By KEVIN EDWARDS

THIS month we're going to look at two more sprite routines and we'll also see how useful a multicoloured character definer can be.

Program I is the Mode 2 multi-coloured character definer as promised last month. This will allow you to design your own sprite graphics with minimal effort. These sprites can then be displayed on the screen by using the other programs given in this article.

Sprites, for the uninformed, are multicoloured characters that can be freely moved around the screen without destroying any background information.

Until now the only way to design sprites was to use graph paper and coloured pens. The problem is that this technique is very time consuming. So to save time and trouble I have designed a simple sprite definer. Type it in, save it and then RUN.

The first question you'll be asked is "Load old file Y/N?" At this point your reply should be N – you haven't created a data file yet!

If you have saved a data file you can load it back in by pressing Y, after which the file name will be requested. On entering this the file is loaded and the editing mode is entered.

Assuming you have not just loaded a file, you will be asked for the sprite's dimensions. These will be provided by data held at the start of the file. (Skip the next few paragraphs if you've loaded a sprite from a file.)

Now you will be asked for the width of your sprite in paired pixels – between 1 and 8. Remember that each byte of the Mode 2 screen corresponds to two pixels.

Predictably, the next question asks you for the height of the sprite – this time in multiples of eight pixels (the height of one character cell).

The editing mode will be entered as soon as the sprite's height has been typed in. If you've loaded a file from tape or disc, you'll be in the editing mode already.

A grid, directly corresponding to the size of the sprite, will be displayed on the screen. Underneath it is the colour palette which consists of 16 differently coloured blocks.

Below the red block is the colour pointer. This indicates the colour of the editing pen – that is, the colour you'll be filling the cells of the grid in with. Initially the editing pen is red.

The pointer, and hence the colour, can be changed by pressing the f0 and f1 keys. f0 selects the colour to the left of the colour pointer and f1 selects the colour to its right.

You should have also noticed the cursor flashing at grid reference A,A. This cursor is your means of indicating which pixel of the sprite is being edited.

You can move the cursor anywhere in the grid by pressing the appropriate cursor arrow key. Once you've correctly positioned the cursor you can change the colour of the cell to the selected pen colour by pressing Space. Doing this when the pen is black clears the cell, since black is the background colour.

When being edited the sprite is magnified several times. To view the sprite "life-size" press f2. It will now be displayed to the right of the editing grid. The editing mode will be automatically resumed.

If at any time you want to fill the whole grid with the palette colour you can do so simply by pressing f8. Be very careful though – your previous design will be erased.

If you wish to redefine the sprite's dimensions you press f7 while in the editing mode, which has the effect of rerunning the program.

When you are satisfied with your creation you can save the sprite to tape or disc by pressing S.

You will then be asked whether or not you wish to save just the sprite data. Entering N indicates to the program that the sprite's dimensions should also be saved. This information is needed if the sprite is to be reloaded at another time for editing.

Pressing Y saves just the sprite data. This means that the sprite dimensions are not saved and that the file cannot be loaded by the definer for editing.

The data is saved in this way so that the sprite routines, introduced in last month's article, can be used to display the data. In other words, the data is saved column by column from the left of the sprite to the right.

After either selection you will be asked for the file name under which the file will be saved. This must be a maximum of seven characters in length so that the program can be used with disc systems.

The final command, L, allows you to load a new sprite into memory.

After pressing L the file name of the sprite should be entered. The sprite will now be loaded – make sure you've saved the previous sprite beforehand or you will lose it forever.

Also remember that the file cannot be loaded if the sprite's dimensions were

→

```
   10 REM Multi-size Sprite routine
   20 REM By Kevin Edwards
   30 MODE 2
   40 HIMEM=&2E00
   50 FORL=0TO2STEP2:P%=HIMEM
   60 [OPTL
   70 .sprite STX&74
   80 STY&75:STY&78
   90 .user_entry LDX#0
  100 .main_part LDA&76:AND#&F8:STA&7
0
  110 LDA&77:STA&71
  120 LDA&76:AND#7:TAY
  130 .column LDA&FFFF,X:EOR(&70),Y
  140 .onto_screen STA(&70),Y
  150 INX:BEQ inc_data_high
  160 .end_checks INY:CPX&78:BEQ end_
of_column
  170 CPY#8:BNE column
  180 LDA&70:ADC#&7F:STA&70
  190 LDA&71:ADC#2:STA&71
  200 LDY#0:BEQ column
  210 .inc_data_high INC column+2:JMP
 end_checks
  220 .end_of_column CLC:LDA&76:ADC#8
:STA&76:BCC no_high:INC&77
  230 .no_high CLC:LDA&78:ADC&75:STA&
78
  240 DEC&74:BNE main_part
  250 RTS
  260 .calc_loc LDA#&30:STA&81
  270 LDA#0:STA&82
  280 TYA:EOR#&FF:TAY:AND#7:STA&80
  290 TYA:LSRA:LSRA:LSRA:ASLA:TAY
  300 TXA:ASLA:ROL&82:ASLA:ROL&82
  310 ASLA:ROL&82
  320 ADC&80:ADC&C376,Y:STA&76
  330 LDA&82:ADC&81:ADC&C375,Y:STA&77
  340 RTS
  350 ]NEXT
  360 FOR L%=0 TO &5F
  370 READ L%?&C00
  380 NEXT
  390 FOR X1%=0 TO 70
  400 PROCsprite_onoff
  410 *FX 19
  420 PROCsprite_onoff
  430 NEXT X1%
  440 END
  450 DEFPROCsprite_onoff
  460 X%=X1%:Y%=255:CALLcalc_loc
  470 column?1=0:column?2=&C
  480 X%=4:Y%=24:CALLsprite
  490 ENDPROC
  500 DATA 0,0,0,&11,&11,0,&11,&11
  510 DATA 0,0,0,0,0,0,3,3
  520 DATA 1,1,1,1,0,0,0,0
  530 DATA 0,&11,&11,&33,&27,&27,&27,
&33
  540 DATA &11,&11,4,4,4,4,3,&2B
  550 DATA &2B,&2B,&2B,&2B,&17,&17,&1
7,&17
  560 DATA 0,&22,&22,&33,&1B,&1B,&1B,
&33
  570 DATA &22,&22,8,8,8,8,3,3
  580 DATA 3,3,3,3,3,3,3,3
  590 DATA 0,0,0,&22,&22,0,&22,&22
  600 DATA 0,0,0,0,0,0,3,3
  610 DATA 2,2,2,2,0,0,0,0
```

Program II

From Page 91

not saved when the file was originally created.

Files which contain only sprite data are ready to be used with the sprite display routine without modification. All you need to do is *LOAD the data into page &C (or wherever the data is needed) and change the sprite parameters in the sprite routine accordingly.

The start of your sprite program should look something like this:

```
10 *LOAD SPRITE1 C00
20 width=4
30 height=16
40 data=&C00
50 REM Start of sprite routine
```

All this is quite simple so far. What we need now is a routine that will be capable of displaying sprites of varying sizes after the program has been assembled.

After all, I'm sure you'll be using sprites of different sizes in your own programs. A routine capable of displaying only one size of sprite is rather limiting.

Ideally, what we require is a routine we can call with the dimensions of the sprite held in the 6502 X and Y registers. In fact, only a few changes are required to last month's sprite routine to do this.

HOW TO WRITE MACHINE CODE GAMES

Program II is the modified sprite routine along with the screen location calculator from last month's article. This is a clever routine that calculates the screen location, for Mode 2, of a specified X and Y coordinate using the bottom left corner as the origin.

Program II shows how easy it is to move a sprite – in this case a flower pot – across the screen using the new routine.

To display a sprite using the new routine all we need to do is:

- Call the screen location calculator routine (.calc_loc) with the screen X and Y coordinates in the 6502 X and Y registers – line 460 of Program II. The result is automatically stored in zero page, ready for the sprite routine.
- The pointer to the sprite graphic data must be stored into locations (column+1) and (column+2) – low byte then high. See line 470 of Program II.
- The dimensions of the sprite should be loaded into the X and Y registers.

Now the main sprite routine can be called (.sprite) – line 480 of Program II. This displays/erases the sprite on/from the screen. Remember, the sprite routine uses EOR!

It's still rather long winded, but there's no simple way of passing so many parameters to the relevant routines.

The effects produced by all the programs so far have relied on a little bit of Basic. The problem with this is that jumping in and out of Basic takes up valuable time.

This is made even worse when sections of a Basic program are executed in between machine code routines – especially when timing is critical such as when using *FX 19 to wait for start of retrace period.

So now we move on to Program III,

Line No.	
40-60	Enter assembler and assembles code at &2E00.
70	Stores width of sprite in &74 – in paired pixels.
80	Stores height of sprite in &75 and &78 – in pixels.
90	Data offset register = 0.
100-110	Copy column start address into &70, &71, the low byte being the top of the current character column (AND &F8).
120	Loads offset register with screen low byte ANDed with 7 – to get the offset from the top of the character column.
130-140	Read data byte, EOR it with screen byte and store it back in video RAM.
150	Increments data offset register. If X register is zero, branch so that data pointer high byte can be incremented.
160	Increments screen memory address offset register. Checks if end of column has been reached. If it has, the branch is taken.
170	Checks to see if start of next character row column has been reached. Branches if it hasn't.
180-200	Add &280 to screen address to move down to next character row. Then change screen offset register, Y, to 0.
210	Increments data pointer high byte and continues with rest of the column.
220	Adds eight to column's start address. This moves start address right by two pixels.
230	Changes data offset stop pointer so that end of next column will be terminated correctly.
240	Checks to see if all of the columns have been displayed. Branches if they haven't.
250	Exits from sprite routine.
260	Stores Mode 2 screen start address high byte in &81.
270	Stores 0 in the workspace. This is used to accommodate any overflow that occurs when X is multiplied by 8.
280	EORs the Y coordinate with &FF (to change origin from top left corner to bottom left corner) and then ANDs result with 7. This tells us how many whole character rows down the screen the sprite is.
290	Calculates INT(Y/8)*2. The result of Y/8 is multiplied by 2 to allow us to make use of ROM multiplication table. This starts at &C375 and consists of 32 entries of an &280 multiplication table. Each entry in table is stored in pairs – high byte then low byte.
300-310	Calculates X*8. The three most significant bits of the result are held in bits 0 to 2 of location &82 the workspace.
320	Adds screen low byte to low byte of result of X*8. Then adds low byte of &280 multiplication table to result. The final total is stored in location &76.
330	Adds high byte of X*8 to screen address high byte. Then adds high byte of &280 multiplication table and stores result in location &77 – any carry which may have occurred from the addition of the low bytes is also included in the result.
340	Back to Basic.
350	Exits assembler.
360-380	Read and store sprite data – a flower pot.
390	Start of a loop – this defines X coordinate of sprite.
400	Displays sprite on screen.
410	Waits for retrace period.
420	Erases sprite from screen.
430	Next X coordinate.
440	End of program.
450-490	The sprite display/erase procedure.
460	Sets X% and Y% to sprite's screen coordinates and calls screen location calculator routine.
470	Resets sprite data pointer.
480	Defines sprite's dimensions before CALLing main sprite routine which in turn displays/erases the sprite.
500-610	Flower pot data.

Description of Program II

which uses only machine code to move the flower pot up the screen.

The procedure PROCsprite_onoff, from Program II, has been replaced by a subroutine (.onoff) – lines 100-120.

Location &83 is used to keep track of the sprite's Y coordinate. Between each movement, 4 is added to Y to move the sprite up 4 pixels – line 90. Try changing line 90 so the sprite moves one pixel at a time. All you need to do is change the ADC#4 to ADC#1.

By using simple programming techniques you'll be able to produce fully animated sprites. This can be achieved by flicking between different sets of sprite data just like flicking through a book which has different sketches on each page.

I'll leave that problem for you to solve – it's not as hard as it sounds.

See you next month when we'll look at some more useful techniques found in machine code games.

```
   10 REM Full machine code demo
   20 REM By Kevin Edwards
   30 MODE 2
   40 HIMEM=&2E00
   50 FORL=0TO2STEP2:P%=HIMEM
   60 [OPTL
   70 .demo LDA#23:STA&83
   80 .demo1 JSRonoff:LDA#19:JSR&FFF4
:JSRonoff
   90 LDA&83:CLC:ADC#4:STA&83:BCCdemo
1:RTS
  100 .onoff LDX#20:LDY&83:JSRcalc_lo
c
  110 LDA#0:STAcolumn+1:LDA#&C:STAcol
umn+2
  120 LDX#4:LDY#24:JSRsprite:RTS
  130 .sprite STX&74
  140 STY&75:STY&78
  150 .user_entry LDX#0
  160 .main_part LDA&76:AND#&F8:STA&7
0
  170 LDA&77:STA&71
  180 LDA&76:AND#7:TAY
  190 .column LDA&FFFF,X:EOR(&70),Y
  200 .onto_screen STA(&70),Y
  210 INX:BEQ inc_data_high
  220 .end_checks INY:CPX&78:BEQ end_
of_column
  230 CPY#8:BNE column
  240 LDA&70:ADC#&7F:STA&70
  250 LDA&71:ADC#2:STA&71
  260 LDY#0:BEQ column
  270 .inc_data_high INC column+2:JMP
 end_checks
  280 .end_of_column CLC:LDA&76:ADC#8
:STA&76:BCC no_high:INC&77
```

→

Program III

Join the communications revolution

We've found the missing link!

By DEREK MEAKIN
Managing Editor
The Micro User

MANY months ago we forecast that 1985 would be the Year of Communications. And so it is turning out.

Sales of modems are soaring. Micro users are joining Prestel in their thousands. Bulletin boards are springing up all over the country.

But until now one thing has been missing.

What has been desperately needed was a national database for microcomputers that would combine a low-cost electronic mail service with a giant bulletin board you could access first time every time, that would allow you to chat freely with other users, that would have no restriction on the length of material you could send or receive – and would also enable you to send telex and telemessages from your own micro.

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Until now Telecom Gold has been the preserve of big business – used by the giants of industry, commerce and finance to link their operations in Britain with the rest of the world. And Telecom Gold's charges reflected its elevated status.

That has now changed. Thanks to MicroLink, every micro user can afford to key into Telecom Gold and make use of its growing range of services. For less than the cost of a first class stamp you can have a message the size of this page delivered to one destination or hundreds . . . all in a fraction of a second. And that's just one example of the time and money you'll be able to save with MicroLink.

All of us at *The Micro User* are very excited about the enthusiastic reception the new service has been given by our readers – and about its unlimited potential for future development.

Come and join us – and explore with us the whole new world that is being opened up by MicroLink.

HOW TO WRITE MACHINE CODE GAMES

From Page 93

```
  290 .no_high CLC:LDA&78:ADC&75:STA&
78
  300 DEC&74:BNE main_part
  310 RTS
  320 .calc_loc LDA#&30:STA&81
  330 LDA#0:STA&82
  340 TYA:EOR#&FF:TAY:AND#7:STA&80
  350 TYA:LSRA:LSRA:LSRA:ASLA:TAY
  360 TXA:ASLA:ROL&82:ASLA:ROL&82
  370 ASLA:ROL&82
  380 ADC&80:ADC&C376,Y:STA&76
  390 LDA&82:ADC&81:ADC&C375,Y:STA&77
  400 RTS
  410 ]NEXT
  420 FOR L%=0 TO &5F
  430 READ L%?&C00
  440 NEXT
  450 CALLdemo
  460 END
  470 DATA 0,0,0,&11,&11,0,&11,&11
  480 DATA 0,0,0,0,0,0,3,3
  490 DATA 1,1,1,1,0,0,0,0
  500 DATA 0,&11,&11,&33,&27,&27,&27,
&33
  510 DATA &11,&11,4,4,4,4,3,&2B
  520 DATA &2B,&2B,&2B,&2B,&17,&17,&1
7,&17
  530 DATA 0,&22,&22,&33,&1B,&1B,&1B,
&33
  540 DATA &22,&22,8,8,8,8,3,3
  550 DATA 3,3,3,3,3,3,3,3
  560 DATA 0,0,0,&22,&22,0,&22,&22
  570 DATA 0,0,0,0,0,0,3,3
  580 DATA 2,2,2,2,0,0,0,0
```

The machine code routines in Program III are identical to those in Program II with the following additions.

Line No.	
70	Stores sprite's Y coordinate in location &83.
80	Displays sprite, waits for the retrace period and then erases sprite. Remember the display and erase routines are the same.
90	Adds 4 to sprite's Y coordinate to move it up the screen by 4 pixels. A branch is taken if sprite's Y coordinate hasn't overshot top of screen. This repeats process for a new position. Otherwise program finishes.
100	Calculates screen location for the sprite's X and Y coordinates.
110	Resets sprite data pointer so that data starting at &C00 is displayed.
120	Defines sprite's dimensions before calling sprite display/erase routine.

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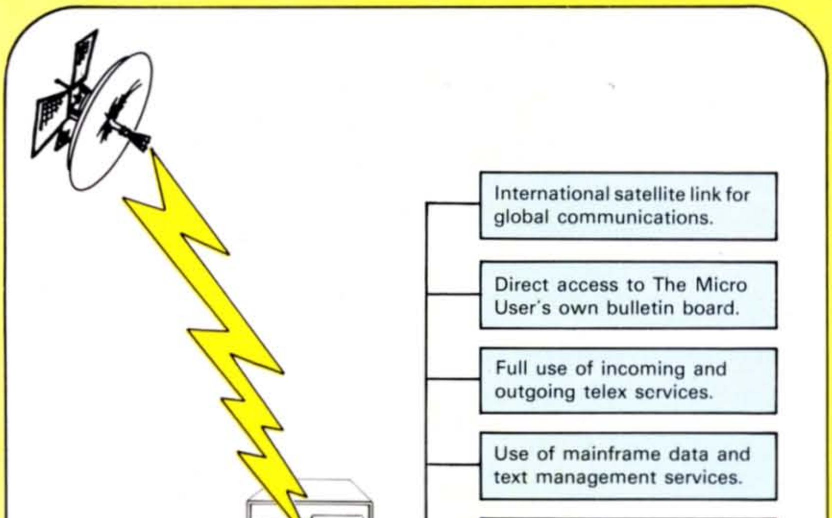

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Across the Eridanus and into the maze

SOME authors complain that reviewers don't read the instructions or background of their games. I do – if I can find them – particularly if they lay claim to realism. However . . .

> “*Dear Sir,*
>
> *I almost never write to correct reviews, but Alice has done a hatchet job on the background to Level 9's Silicon Dream adventures and I think it's worth correcting.*
>
> *1. I agree that Eden is not orbiting Eridani A. The correct star is Eridani E. (Red giant, 6 parsecs away, possible G2 companion. Main reason for choice is that almost everyone else goes to Alpha Centauri.)*
>
> *2. It is perfectly possible for one star of a binary system to have planets. (Scale up our solar system and Jupiter is a "star" with "planets".)*
>
> *3. Sending colonists by radio is technically feasible but morally repellent. People are sent for PR reasons and to provide a soap opera for the unemployed on Earth, but really to make exploring the ship's 7,000 rooms quite tricky.*
>
> *4. The Snowball engines are powerful particle accelerators, descended from "star wars" beam weapons. After some fraction of a second the beam would penetrate the atmosphere and reach the ground.*
>
> *5. The books ("Hothouse", etc) describe lots of amusing plants, with names that allow me some awful puns. Best wishes*”

The above is a short but, I hope, fair precis of two letters from Pete Austin of Level 9. I apologise to him if I put anyone off the actual games.

The layout of the spaceship was a very neat idea, producing a "gestalt" when the player finally realises how to find his way around – based on the old electrical resistor codes – and Return to Eden, which I have now got through using the hints, is up to the same high creative level.

Indeed the only problem they present is when I try to review games from elsewhere. Very few can really intrigue me into finishing the course, but I have "solved" all the Level 9 games except Emerald Isle and that, so far, keeps up the excellent value (£6.95), plus you get graphics and text linked for the first time.

When I first looked at Eden – without any hints – I managed to cross the river only to find a maze. I assumed this was the road to Enoch city so I gave up. I hate "drop to map" mazes, but actually you only go there to stop the plundering parrot.

My comment on the "morel" or "fish fungus" always wanting to "do something" was an obscure hint that this game requires patience. WAIT is a vital command to avoid the attention of the helicopter gunships and is also required to reach the entrance to the city.

Here you will find a credit card which you must wheeler-deal correctly in order to become a man of property and eventually mayor of Enoch. At this point you rediscover the visor that puzzled so many in Snowball.

This device actually does exist. It is based on equipment used by helicopter pilots in Vietnam and has also been proposed as a way of playing computer chess with holographic pieces thus:

"We may be able to sit in front of a chess board on which there are (holographic) pieces that the machine can move. We need only look at a piece, blink, look at the square we wish to move to, blink, and the computer makes the move".

The computer detects where you look by shining a beam of light on the eye. Note that a gun was trained on what the helicopter pilot was looking at.

I can't give clues to Level 9 games since they cover almost everything with hint sheets and the answers are their copyright. But I have scored 6,261 points – out of 6,000 – in Adventure Quest and also been amused by dropping almost everything in the hole in the Quest lake – the staff and the jellyfish have particularly interesting results.

However, I still haven't seen the message at the bottom of the well. I tried waving the medallion but the light was too feeble.

Pete Austin suggested that I carry the lamp and rub the jellyfish which bangs you all over your tracks so I gave up after 100 tries. Just unlucky I guess.

On the question of hint sheets, Epic Software have now produced a set for their four games. This is another professional company who take pains to remove the slightest bug from their products. I had actually extracted the messages from the Epic games but they don't help to navigate mazes.

● *Two tips to authors are:* If possible, send your review copy on a disc, as this speeds up LOAD, SAVE and RESTORE. And, if you really insist on including a maze, then send the reviewer the path through it. This might improve his temper.

A touch of the Hobbits

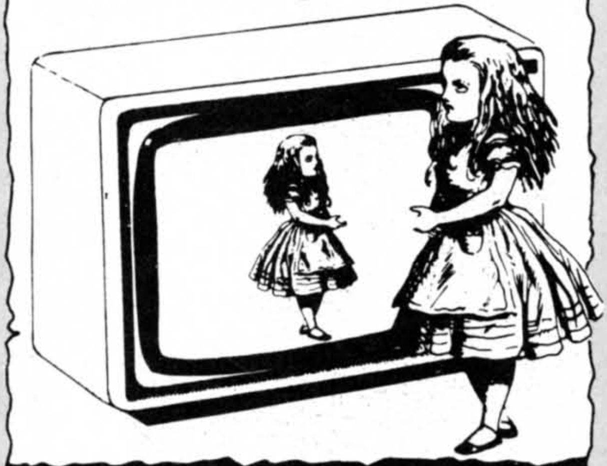
Fantasia Diamond
(Hewson Consultants)

TRIED this months ago and got stuck. It's rather like The Hobbit – you have to mingle with "intelligent" characters who keep messing about and being shoved into a dungeon with you.

While in pokey the friendly green elf keeps frisking you for keys while the toy robot eats any food you might have, rendering you incapable of lifting a fishing rod.

Even if you get out of the cell you are stuck – yuch! – in a complex of dark

Alice through the VDU



Our monthly foray into Adventure games

caves with a cunning green pixie who regularly drags you back to the cell for more porridge – if only there were – with the two pests.

Incidentally, why do people think it's my portrait that the three bears use as a dartboard in the Castle of Riddles?

Anyway I did nothing (TIME PASSES ...) and then read a review that liked the game, so I tried again.

The program is supposed to know 300 words, but I still can't SIT in the comfortable chair. Even if I could would the Spanish Inquisition threaten to prod me with a soft cushion?

Nor can I INSERT a battery in the robot who doesn't know how to LIFT anything anyway. I must be missing something.

LOOK SCREEN

The screen says: "You do nothing". *Thinks: "Good job there aren't any rabbits in this game. These characters get up to all sorts of things when I can't see them".*

LOOK CASSETTE CASE

You look at the cassette case. In it is a paper insert with a picture.

REMOVE PAPER INSERT

You remove the paper insert. It has lots of cunning but friendly instructions hidden inside.

READ FRIENDLY INSTRUCTIONS

It takes about five minutes to read all the small print. One useful thing you find is that you can repeat a command, of up to 78 characters, by pressing Escape. Also there are differences between LOOK AT, INTO or THROUGH and it is possible to get HINTS at some places.

However, the victual thing is to immediately eat and drink anything you find. Now, marching on your stomach, you and your Noddy friends can begin to brush the opposition aside with blows from rods, batons, mirrors – indeed anything that you can't eat.

Eventually you break into a music room but, if you haven't found the hints, there is no way you'll break away from the untidy, longsighted, tone-deaf occupant.

There are only some 70 rooms in the game, but the "intelligent" characters make it quite complex. Give me a table to climb on any day – much more reliable.

I know their behaviour is just a figment from a random number generator but, if you liked The Hobbit, you'll probably like this aleatory alexia (a random device that does not understand words).

HERE are the answers to some earlier problems:

● **Ladders Problem:** Two ladders, L1 and L2, cross at height C (Figure I). How wide is the alley A? If you have done any algebra you should recall that the squaw on the hippopotamus is equal to the sum of the squaws on the other two hides, therefore:

```
1/C = 1/SQR(L1*L1-A*A) +
1/SQR(L2*L2-A*A)
```

If you don't follow that, then take Nigel Molesworth's advice in Down with Skool – ask your maths teacher.

Now the simplest way to solve nasty equations with one unknown is by Horner's method of approximation. Just enter Program I and start guessing away. It's just like playing the old Moon Lander. If the answer is positive then

→

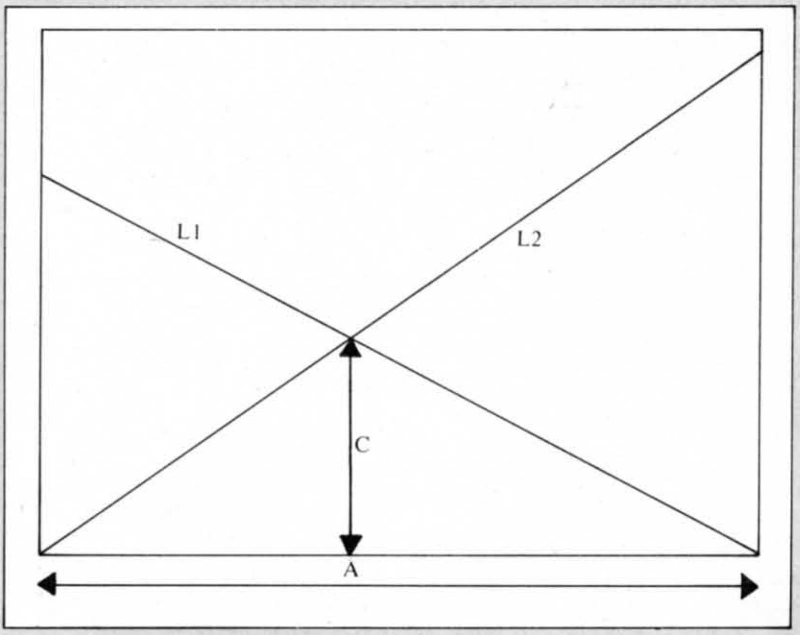


Figure I: Ladders problem

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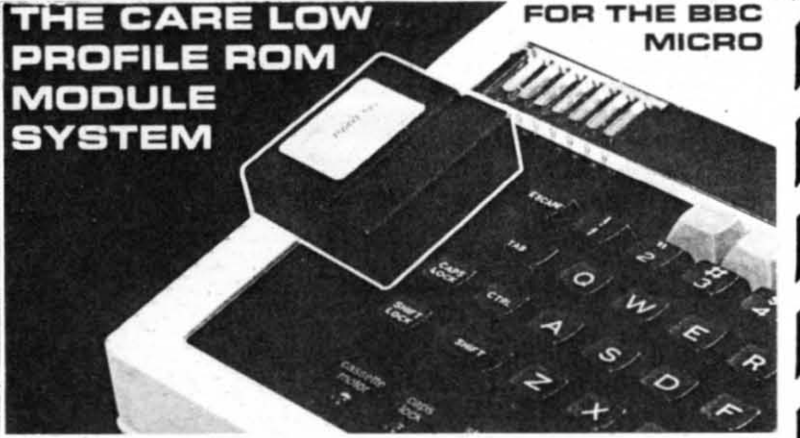

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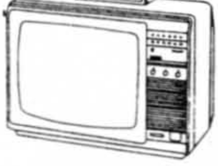

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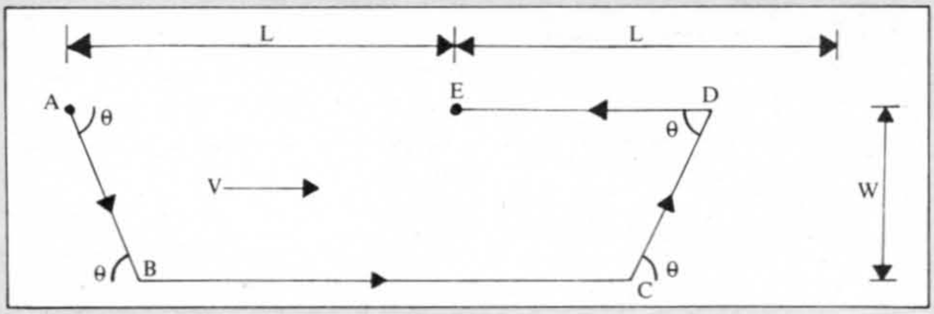

Figure II: TinTin's Run around the carriage

From Page 101

drop your guess and vice versa until you find an input A that results in zero. That's the width of the alley.

```
   10 INPUT "L1,L2,C",L1,L2,C
   20 INPUT "A",A
   30 PRINT C-1/(1/SQR(L1*L1-A*A)+1/S
QR(L2*L2-A*A)):GOTO20
```

Program I

The particular example I chose was for L1=87, L2=105, C=38 and the answer is A=56.139. This was taken from Page 64 of Martin Gardner's Mathematical Circus (Pelican) except that he gives the answer as A=63. You may like to discover the misprint yourself. Note: All the lengths should be integers.

● **TinTin's Run:** Quite complex if you got involved in a quartic equation. Figure II shows TinTin's path over the ground and again it's simple – just let the computer do the work. We have three knowns:

V = Velocity of carriage.
W = Width of carriage.
L = Length of carriage.

and one unknown:

T = TinTin's speed.

Then, again from Pythagoras, the time taken to run AB (or CD) is:

W/SQR(T*T–V*V)

Time to run BC is:

L/(T–V)

Time to run DE is:

L/(T+V)

and we are given that the total time = 10 seconds.

Just another nasty equation with one unknown, so again use simple approximation. Type in Program II and keep guessing T until you get the answer 10. You should find T to be slightly better than a four-minute-mile pace – 22 feet per second – so it's fairly realistic.

```
   10 V=8.8:W=12:L=88
   20 INPUT "T ",T
   30 PRINT 2*W/SQR(T*T-V*V)+L/(T-V)+
L/(T-V):GOTO20
```

Program II

All this arose from the cubic equation I found in Xanadu Cottage (Alligata) and solved by approximation. *If you haven't found it, go SE and blow.*

If you got stuck in quartic equations and imaginary numbers then that was the idea and you probably learnt something. But as I said, such knowledge is often as useless as knowing how to kill dragons.

The prize goes to A. Mitchell of Ledbury, who was first to answer both problems and used approximation driven by binary guessing – the program does all the work. It reminded me of how to treat the frog in Lords of Time – Keep It Short and Simple. Neat as well.

P.S. To solve TinTin's halfway run, just replace line 30 with:

```
   30 PRINT W/SQR(T*T-V*V)+L/(T-V):GO
TO 20
```

to convince those who didn't get 18.31 feet per second.

Again I first saw this problem in Martin Gardner's Scientific American column. He had a dog trotting around a marching square and thought it involved solving a quintic.

● **Bricks:** We all drop bricks, which reminds me that some of you should have managed to stop after 134,466 moves – quite a big adventure.

A tip is DON'T count the bricks as you go – just see how many it left when it halts. *Now for this month's puzzle:*

Mrs THATCHER'S MAZE

SO CALLED because there is no turning back. All you have to do is drive through to the exit.

Problem is that the choice at the 25 crossroads depends on where you came from – just like real life. It can be done in 31 moves, but mainly illustrates, as usual, that having a listing doesn't help to solve the puzzle.

Note that the "." in the DATA are just to be clearer – make them spaces.

Alice

```
   10 DIM D$(25)
   20 FOR I= 1 TO 25
   30 READ D$(I):REM 25 X-ROADS
   40 NEXT I
   50 P=6:D=10:REMSTART AT 6 GOING EA
ST
   60 REPEAT:W$=MID$(D$(P),D,3)
   70 PRINT"CAN GO ";W$
   80 INPUT "CHOOSE ",A$
   90 IF INSTR(W$,A$)=0 THEN 80
  100 IF A$="N" THEN P=P-5:D=1
  110 IF A$="S" THEN P=P+5:D=4
  120 IF A$="W" THEN P=P-1:D=7
  130 IF A$="E" THEN P=P+1:D=10
  140 UNTIL P=21 AND D=10
  150 PRINT "EXIT":STOP
  160 DATA "E.....S"
  170 DATA "EW....S..S"
  180 DATA "W.....W"
  190 DATA "E.....W..E"
  200 DATA "W........S"
  210 DATA "N..SE.N..NE"
  220 DATA "EW.SEWSW.SE"
  230 DATA "NW.SE.NW.SE"
  240 DATA "NE.S..SW.E"
  250 DATA "N..W.....N"
  260 DATA "NE.SE.NS"
  270 DATA "EW.E..NSWSE"
  280 DATA "N..S.....NS"
  290 DATA "N..SE.N"
  300 DATA "N..S.....S"
  310 DATA "NE.SE.NS"
  320 DATA "E..EW.NSWNE"
  330 DATA "NE.E..N..NE"
  340 DATA "EW.EW.NW.NE"
  350 DATA "NE.SW....N"
  360 DATA "...E..N"
  370 DATA "...EW.NW.NE"
  380 DATA "...EW.NW.NE"
  390 DATA "...EW.NW.NE"
  400 DATA "...W.....N"
```

Program III

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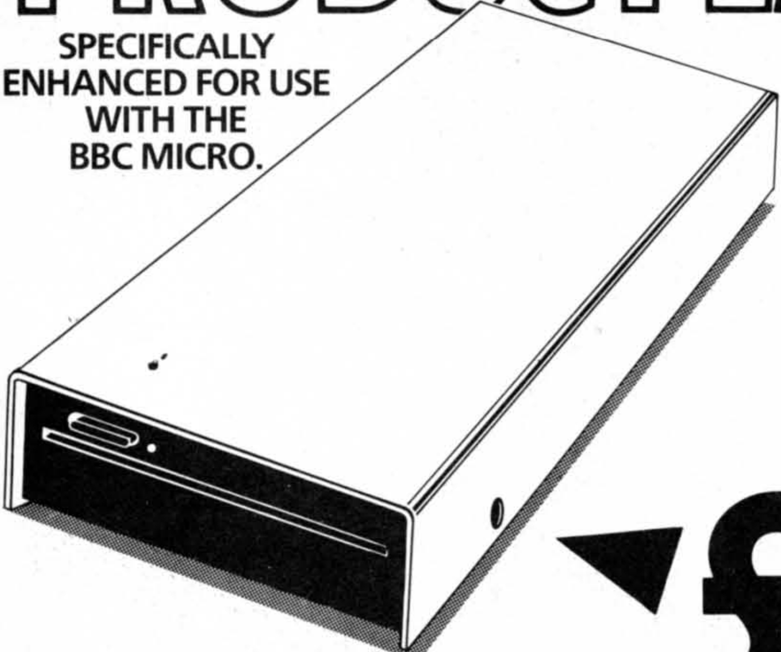
SPECIFICALLY ENHANCED FOR USE WITH THE BBC MICRO.



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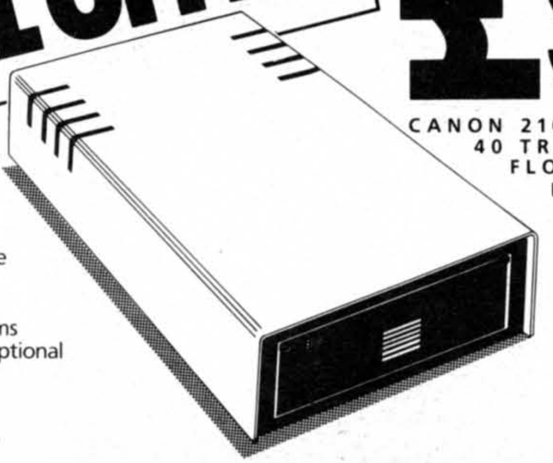

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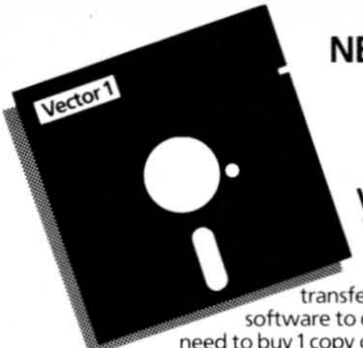
*This test requires and oscilloscope & alignment disc.



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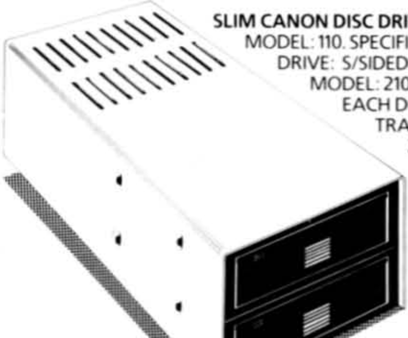

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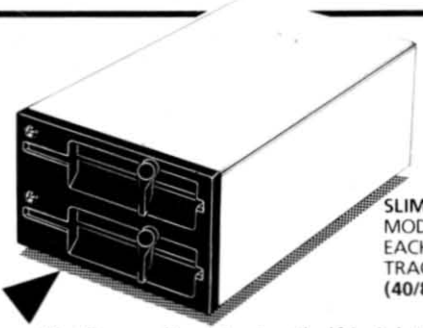

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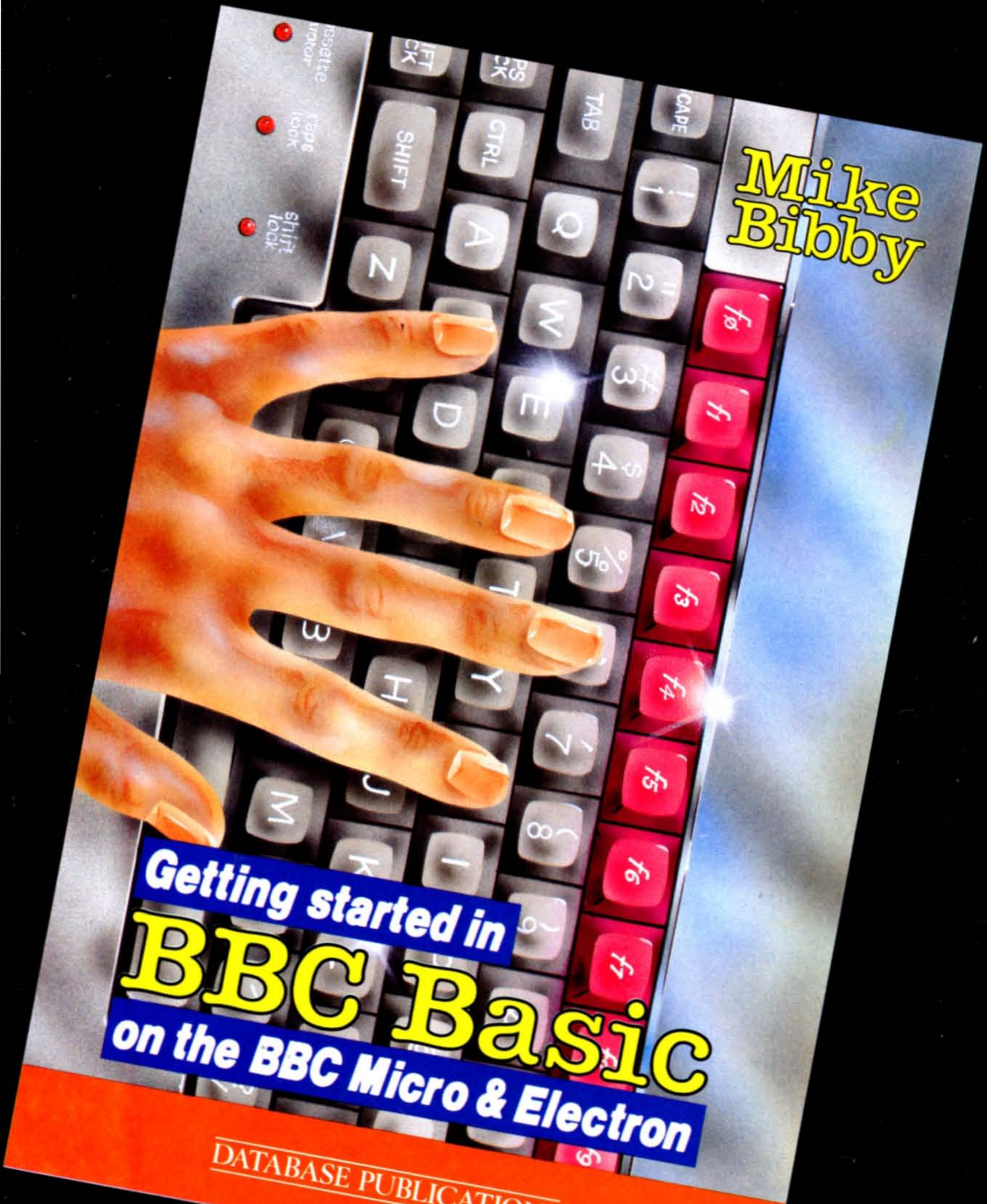
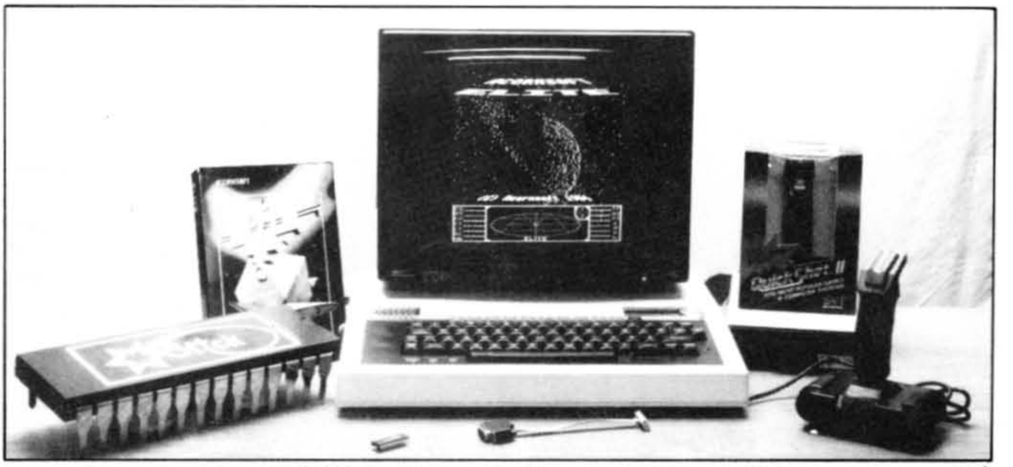

Mike Bibby
Getting started in
BBC Basic
on the BBC Micro & Electron
DATABASE PUBLICATIONS

It's here, the New Issue 2+ Starstick ROM & Quickshot Joystick



Picture shows Starstick ROM, Patchlead and Quickshot Joystick (along with Acornsoft's Elite Package – by kind permission of Acornsoft)

This new release of the very popular Starstick & Quickshot programmable joystick offers new possibilities. Over 30 extra commands which include:

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***Kill**
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***Prop**
***Reset**
***Ksave**
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Fully help driven format with 20 page manual including full fitting instructions.

Not only is the package fully programmable, but it's response time is also user variable. Thus giving YOU the ability to tailor the joystick to YOUR requirements, as only YOU can.

The new issue software is fully compatible with Disc versions of Acornsoft's 'Elite', Acornsoft's 'Aviator' and Clares 'Replica'. It features relocatable workspace to enable it to work with many of the few games it would not work with before. As in the previous issue, the Starstick ROM is fully 'TUBE' compatible.

Specifically designed with the Disc user in mind, the software is not affected by any combination of the BREAK, SHIFT, or CONTROL keys.

The self centring, rapid action Joystick plugs into the user port and is managed by the Starstick ROM. The ROM monitors O.S. calls and patches the joystick into games programs. The Starstick functions with most games and even those that are not designed to function with joysticks. IT IS VERY IMPORTANT HOWEVER THAT THE GAMES USE LEGAL OPERATING SYSTEM CALLS AS MOST DO.

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All commands in MICROTEST ROMS can be prefixed by 'M' should any other ROM try to intercept the same command name.

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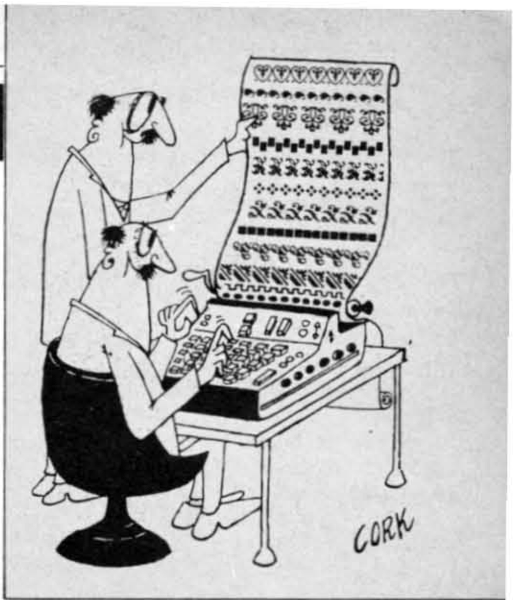


Settle the £'s hash for good

ONE annoying feature of most matrix printers is that you have to change the character set, either via control codes or DIL switches, in order to mix £ and # signs.

One solution to this problem on the Epson FX-80 is to use the downloadable character set, but you then lose the 2k buffer.

A more permanent method is to change the contents of the printer's ROM, replacing the character printed by code 96 by a £ sign.

The FX-80 ROM is an 8k by 8 device, and may be replaced by a 2764 eprom. This modification is performed as follows:

Remove the FX-80 cover. On the main board are four 28-pin sockets, and the rightmost one contains the ROM. If a serial board is fitted, you may need to remove it to get at the ROM.

Carefully remove the ROM and load a copy of it into the BBC's memory via your eprom programmer, which should be set for 2764s.

Copy the contents of the 11 locations &48 to &53 inclusive into locations &480 to &48B. These addresses are those within the ROM, so add an offset corresponding to where your eprom programmer software stores eprom contents.

For example, if the data is stored starting at &3000 the following Basic line will do the required copying:

```
FOR A%=0 TO 10:A%?&3480=A%?&3048:NEXT
```

This modified code may now be "burnt" into a 2764 eprom, and replaced in the ROM socket in the FX80.

Another useful modification is to change the message printed when a self-test is performed to, for example, your name and address, and possibly the printer's serial number, thus making your printer uniquely identifiable.

This message is stored at &1DF1 in the ROM and is terminated by a zero byte. The message cannot contain any control codes, and it must not be longer than about 82 characters. If it is longer the print head will just carry on going, bashing into the endstop!

The addresses mentioned only apply to version 1.1 of the ROM. The version number is printed when a self-test is performed.

Mike Harrison

Add LPRINT to your repertoire

THE resident BBC printer driver routine is excellent in many respects, but one badly needed feature is not present, that of LPRINT – a command run on micros such as the Spectrum and Dragon 32 which will print a string of letters to a printer.

It has the following syntax:

```
LPRINT"String."
```

For the BBC to do a similar job the syntax required is more complicated:

```
VDU2:PRINT"String.":VDU3
```

This can be a nuisance when printing several lines of text, so a more economic method is desirable. The program LPRINT has been designed to perform such a function by using a small machine code routine.

Type in Program I and check it over. Save it before RUNning in case something disastrous happens to it. RUN it and you should see 6502 mnemonics appearing on the screen.

Providing that the program has been correctly entered it is now ready to use. In order to use the LPRINT facility use the following syntax:

```
*LINE String.
```

This will result in the following output to the printer only:

```
String.
```

Note that no inverted commas are required, and remember to insert a space between the *LINE command and the string to be printed.

The program uses the *LINE command which is associated with *CODE. These two commands (which are not documented in the manual) have been written to allow the user to implement his own machine code based routines addressable from Basic.

*CODEx,y will carry out a machine code routine pointed by the user vector (USERV – &200 and &201). When *CODE is called the operating system will jump to this routine with the A set to 0 and X and Y set to x and y respectively.

*LINE text does the same sort of thing as *CODE, but instead of parameters, the X and Y registers contains the address of the text (lo, hi byte).

Line 60 sets the program counter to &B01 (start of the function key buffer). To re-locate the code change this line only.

Lines 100 and 110 check to see whether or not *LINE was called (A=1)

→

From Page 109

and if it is not, the OS "Bad command" routine. Try "CALL &E310" to see this.

Line 130 turns on the printer and line 140 stores the registers and sets Y to 0.

Line 160 reads the string, using the post indirected addressing which accesses the memory location pointed to by the sum of Y and the two zero-page bytes specified. The routine is terminated when the CR (Ascii 13) character is found.

Line 170 turns off the printer and line 210 modifies the USERV user vector to the location of the code (lprint).

Graham Walkden

```
 10 REM LPRINT
 20 REM By Graham D. Walkden.
 30 REM (c) The Micro User
 40 REM Don't program the
 50 REM function keys.
 60 P%=&B01
 70 FORo=0TO3STEP3
 80 [OPTo
 90 .lprint
100 CMP#1:BEQeq
110 JMP&E310
120 .eq
130 LDA#2:JSR&FFE3
140 STX&90:STY&91:LDY#0
150 .begin
160 LDA#1:JSR&FFE3:LDA(&90),Y:JSR&F
FE3:INY:CMP#13:BNEbegin
170 LDA#3:JSR&FFE3
180 .end RTS
190 ]
200 NEXT
210 ?&200=lprint MOD 256:?&201=lpri
nt DIV 256
```

Program I

Now ring the type style changes

HERE'S a program originally devised to allow different type styles on an Epson RX-80 printer, but it should work with any Epson compatible machine.

When loaded and run a title page is displayed (lines 10 to 170). This is then replaced by the master menu, which contains the seven basic type styles available and the Help option.

To prevent a false entry the Escape key has been disabled and each menu has been protected.

The user simply selects his basic type style by pressing the appropriate key and on doing so the sub-menu of the user's choice will be displayed.

Each sub-menu consists of type styles based upon the entry the user typed in at the beginning of the program. To select a style simply press the appropriate key and the computer responds by sending the appropriate code(s) to the printer's buffer.

The flashing cursor is turned back on and the Escape key is enabled. If you accidentally select the wrong sub-menu you have the option of returning to the master menu by pressing M.

The Help mode can be selected at any time by pressing the H key. The mode has two sections. The first deals with the problem of how to find a selected style when it does not appear to exist in the selected menu. The second section displays the VDU codes used to get the different styles.

You are then given the option of returning to the master menu or ending the program. If you decide to exit the program the screen is not cleared, thus enabling you to make up your own styles using the table.

The program can easily be changed to run on any dot matrix by substituting the appropriate codes in the procedures between lines 1910, 2120.

If you wish to cancel a printing mode you can do so by entering VDU2,1,27,1,64,3 which resets the printer.

Richard Smith

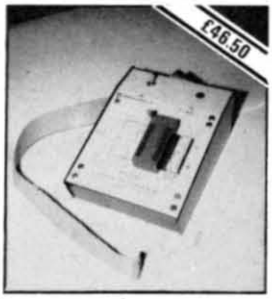
PROCEDURES

menu	The master menu displayed at the beginning of the program. It can be called up at any time.
pica	Pica setting menu.
elite	Elite setting menu.
enlarged	Enlarged setting menu.
condensed	Condensed setting menu.
emphasized	Emphasized setting menu.
doublestrike	Double Strike setting menu.
alternate	Alternate setting menu.
help	The Help mode, which can be called up by the sub-menus as well as the master menu.
e	Sets Elite type.
en	Sets enlarged type.
c	Sets condensed type.
em	Sets emphasized type.
ds	Sets double strike type.
a	Sets alternate type.
esc	Enables the Escape key.

```
  10 REM Epson Type setter
  15 REM by R.T.Smith
  20 REM (c) The Micro User
  25 MODE 7
  30 VDU23,1,0;0;0;0
  40 *TV255,0
  50 VDU7
  60 *FX 200,1
  70 VDU31,9,11
  80 PRINT"   _______________"
  90 VDU31,9,12
 100 PRINTCHR$(141)CHR$(146);"EPSON
TYPE SETTER"
 110 VDU31,9,13
 120 PRINTCHR$(141)CHR$(146);"EPSON
TYPE SETTER"
 130 VDU31,9,14
 140 PRINT"   _______________"
 150 VDU31,10,16
 160 PRINT CHR$(145);"BY RICHARD SMI
```

Turn to Page 148

EPROM PROGRAMMER
FOR THE BBC



A very high quality product direct from the manufacturers, contained in attractive sloping box with low insertion force socket and neon indicator for programming fitted as standard, the software adopts the high efficiency method for programming 2764 and 27128. This allows up to 100% faster programming, software in machine code, supplied on cassette and can be placed in eprom. Very easy to use, menu driven with easy to use instructions. This unit is completely self contained with its own power supply and plugs into the user port.

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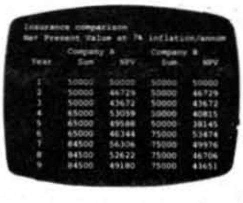

```
Insurance comparison
Net Present Value at 7% inflation/annum

         Company A         Company B
Year    Sum     NPV       Sum     NPV

 1     50000   50000     50000   50000
 2     50000   46729     50000   46729
 3     50000   43672     50000   43672
 4     65000   53059     50000   40815
 5     65000   49588     50000   38145
 6     65000   46344     75000   53474
 7     84500   56306     75000   49976
 8     84500   52622     75000   46706
 9     84500   49180     75000   43651
```

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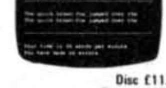

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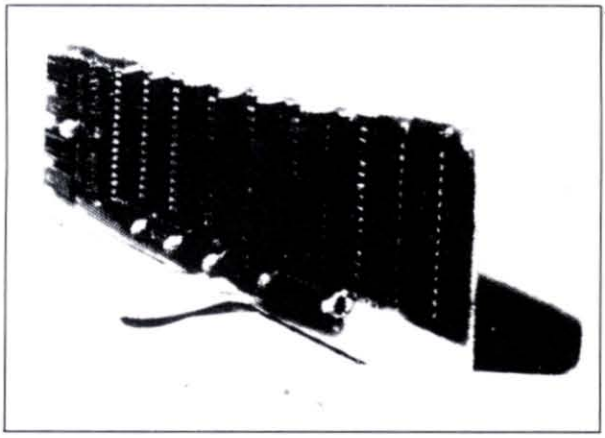
Price £69.95 inc of VAT



◀ **RAM-ROM BOARD**

The RAM-ROM extension board gives an extra 6 sockets for extra ROM's and 2 slots of RAM. This RAM is not an extension of BASIC. It is intended that the RAM be used to develop your own ROM based software. There are in fact seven sockets on the board, the 7th replaces the socket on the main board that would otherwise be taken by the ROM board. (The RAM-ROM board can accommodate both 2764 type EPROMS as well as 27128 EPROMS and ROM).

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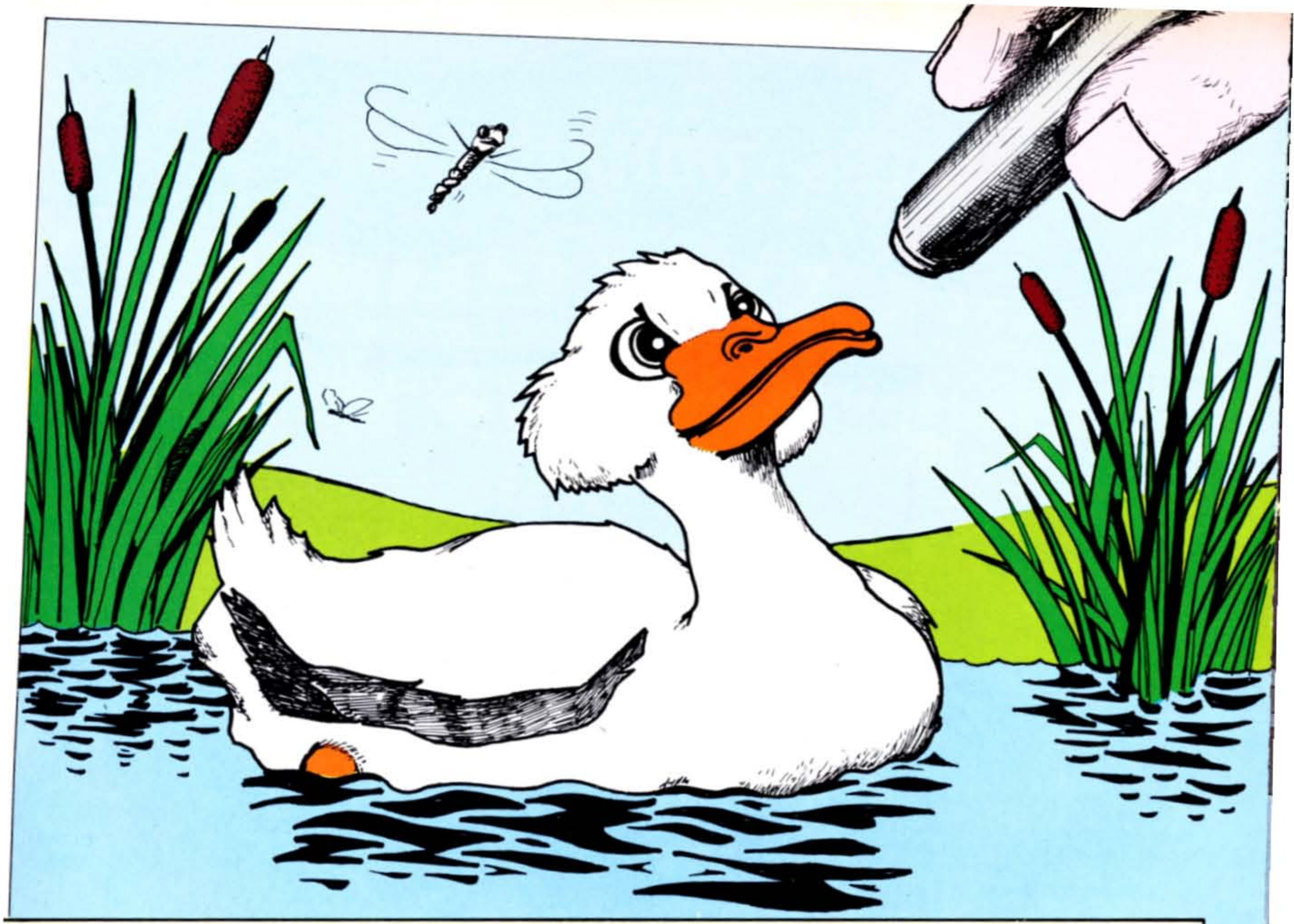


VARIABLES

S%	Score.
H%	Highest score for this session.
put%	A two dimensional array containing the screen coordinates of the ducks.
seq%	One dimensional array containing the randomly generated sequence in which the ducks will quack.
grab%	Space reserved for machine code to read light pen registers.

PROCEDURES

chars	Defines the characters for the ducks.
init	Initialises all variables and gives an example of the ducks quacking on the first pass, when F%=TRUE.
duck	Draws duck number n% at the correct screen position.
quak	Makes duck n% quack by generating sound and overprinting the beak with a different character for an open beak.
river	Plots the river.
veg	Plots the marginal vegetation on the river bank.
setup	Sets up the starting screen for the game.
instr	Displays instructions for the game.
pinit	Assembles the machine code for the light pen and initialises the variables which set the light pen for Mode 2.
lpoint	Returns the light pen position.
lpos	Called to read the light pen registers.
seq	Makes the ducks quack their sequence which the player has to remember.
wait	Utility which causes a delay of n% seconds.
lost	Game lost sequence.
again	Replay offer sequence.
win	Game won sequence called when score is 50.
rnd	Sets up random order for the ducks to quack in.

FUNCTIONS

FNget	Utility which waits for a key contained in a$ and returns the key pressed.
FNfind	Returns the number of the duck being pointed to by the light pen. The routine waits if the position returned does not correspond to a duck but to some other part of the screen.

PROGRAM STRUCTURE

10-100	Initialisation sequence. Turns off Escape key and programs Break to make it safe.
110-120	Offers choice of instructions or start game.
130-160	Offers choice of level of play.
170-260	Main program loop.
180-190	Ducks quack and prompt for player to try to repeat sequence.
200-210	Takes light pen input and either increases score or enters game-lost sequence as appropriate.
220-240	Updates highest score and checks for score of 50, which represents a win.
250	Redefines random quacking sequence for the hardest level of play.

Put The Micro User's light pen to work – and play – in ALAN ROWLEY's unusual adaptation of an old favourite

SIMON *Quackers!*

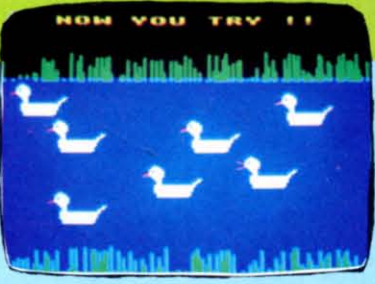
THERE are lots of implementations of the sequence-remembering game Simon, but you always have the same problem – how to relate the keyboard to the screen when the player has to respond.

Now that we have an efficient and cheap light pen for the BBC, courtesy of *The Micro User*, the problem can be made to disappear.

I also decided to ginger up the game a bit by replacing the usual boring grid of lights with a stretch of river and some animated ducks which the player can induce to quack by touching them with the light pen.

Since there is no need to relate the ducks to the keyboard they can be arranged in a non-symetrical way, which adds an extra degree of difficulty.

The game has two levels. In the first on completion of a successful sequence the tune is extended by one note but the beginning sequence remains the same as before.



NOW YOU TRY !!

In the more difficult level 2 version the tune is completely redefined as well as being extended.

The light pen routines are taken directly from the article in the October 1983 issue of *The Micro User*, except that I have made them specific to Mode 2.

You may need to alter the timings for your hardware. See the earlier article for details of how to do this.

As lines 60, 70 protect the program from the effects of Break and Escape, you would be well advised to REM them until such time as you have typed in and debugged your program.

To order light pens, please send your cheque/P.O. made payable to Database Publications Ltd.

£11.65 (kit)
£18.35 (assembled)

Send to: Light Pen offer,
The Micro User,
68 Chester Road,
Hazel Grove,
Stockport SK7 5NY.

Please allow 28 days for delivery

```
   10 REM*****************************
   20 REM*       SIMON QUACKERS      *
   30 REM*    by Alan G. Rowley      *
   40 REM*   (c)  The Micro User     *
   50 REM*****************************
   60 *FX200,1
   70 *KEY10 OLD|M RUN|M
   80 PROCchars
   90 MODE2
  100 PROCinit
  110 a$=FNget("YyNn")
  120 IF INSTR("Yy",a$) MODE1:VDU23,1
,0;0;0;0;:PROCinstr:a$=FNget(" "):MOD
E2:PROCsetup ELSE PRINTTAB(0,0);SPC(6
0);
  130 COLOUR 128:PRINTTAB(0,31);SPC(1
9);
  140 PRINTTAB(3,31);"Level 1 or 2 ?"
;
  150 a$=FNget("12"):dif%=VAL(a$)
  160 PRINTTAB(0,31);SPC(19);
  170 REPEAT
  180 COLOUR15:COLOUR128:PRINTTAB(3,0
)"GET READY !!!":VDU7,7:PROCwait(2):P
RINTTAB(3,0);SPC(15):PROCseq
  190 COLOUR3:COLOUR128:PRINTTAB(3,0)
"NOW YOU TRY !!":VDU7,7
  200 FORI%=0TOS%:IF FNfind<>seq%(I%)
 PROClost:PROCagain
  210 NEXT:COLOUR128:COLOUR6:S%=S%+1:
PRINTTAB(11,29)"Score ";S%;
  220 IF S%>H% H%=S%
  230 IF H%>0 COLOUR4:PRINTTAB(0,31);
"Top Score "H%;
  240 IF S%=50 PROCwin:PROCagain ELSE
 COLOUR6:PRINTTAB(3,0)" WELL DONE ! !
 ":PROCwait(3):PRINTTAB(0,0);SPC(19)
  250 IFdif%=2 PROCrnd
  260 UNTIL FALSE
  270 DEFPROCinit
  280 LOCALi%
  290 DIMput%(1,6),seq%(49),grab% 20:
S%=0
  300 PROCpinit
  310 PROCrnd
  320 FORi%=0TO6:READput%(0,i%),put%(
1,i%):NEXT
  330 DATA1,7,10,11,15,8,3,11,8,16,13
,15,3,19,15,19
  340 PROCsetup
  350 COLOUR128:COLOUR6
  360 PRINTTAB(3,0)"SIMON QUACKERS"'T
AB(9)"by"'TAB(3)"Alan G. Rowley"
  370 IF F% F%=FALSE:FORi%=0TO6:PROCq
uak(i%):PROCwait(1):COLOUR6:NEXT
  380 COLOUR128:PRINTTAB(1,31)"INSTRU
CTIONS ? Y/N";
  390 ENDPROC
```

Turn to Page 153

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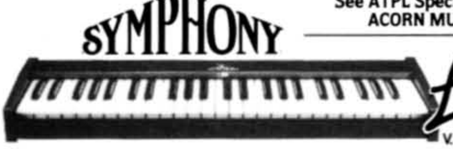

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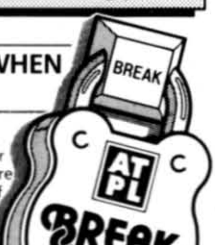

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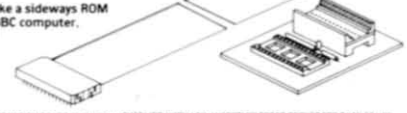

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ONE of the problems often encountered when writing machine code programs is how to decode numbers, such as addresses, into binary and, conversely, how to print out numbers in decimal or hexadecimal.

You could write all of the conversion routines yourself. Some aren't too hard. For example, hex to binary is quite straightforward.

However, often we want to input or print numbers in decimal, and sometimes we want to deal with floating-point numbers like 1.123. This is far from easy when writing in assembler, especially on the 6502. The solution is to call on our friendly Basic interpreter.

The Basic ROM contains many useful routines which you can call from your own machine code programs – there isn't much advantage in calling them from Basic!

The ones I'm going to discuss are mainly concerned with getting numbers in and out of the computer. One particularly handy routine is that which performs the Basic EVAL function.

This takes a string and evaluates it as an expression. For example EVAL("1+2*3") would return 7. This gives the machine code programmer access to the full power of the Basic expression evaluator.

I give the addresses of routines for Basic II first, followed by the equivalent address for Basic I in brackets. All of the examples use Basic II addresses.

First I'll deal with input. If you are familiar with the BBC's machine operating system you will probably know that you can input a line by calling the OSWORD routine at address &FFF1. This enables you to put the string anywhere you want in memory, and to specify which range of characters will be accepted and how long the string can be.

However since we're interested in Basic here, we will use the routine in the Basic ROM which puts the input string where other Basic routines expect to find it, that is at address &600 – the Basic string buffer.

The routine to input a string to this address is at &BBFC (&BC17). It accepts up to 238 characters and all characters typed except control codes in the range Ascii &00 to &1F.

On exit, the length of the string is in the Y register, and this must be saved in address &36 so that Basic knows the length.

If the user presses Escape to end the string input, Basic will generate an "Escape" error. To prevent this, disable the Escape key before calling the routine and enable it again afterwards.

It is usual to print a prompt before asking for input. Single character prompts like ">" and "?" which Basic use can be printed by calling OSWRCH:

```
lda #ASC">"
jsr oswrch
```

However another of the useful routines in Basic prints the string which follows the JSR to the routine, then continues execution after the string. The routine is at &BFCF (&BFCB) and the string to be printed must be terminated by a NOP instruction. Program I illustrates the routines mentioned so far.

This may seem like an awful lot of trouble to do what in Basic would be:

```
REPEAT
INPUT LINE "Type a string  "a$
PRINT "You typed  "a$'
UNTIL FALSE
```

but it's a lot shorter than the code which would be required if the Basic routines hadn't been used.

The next step is obtaining numbers and printing them out.

Once a string has been placed in the string buffer it can be converted into a number by calling the Basic VAL routine. This places the converted number into either the integer accumulator, if the number was a whole one, or the floating point accumulator if it contained a fractional part or was bigger than the maximum integer size.

The integer and floating point accumulators are groups of memory locations in zero page which Basic uses to hold numeric results.

The integer accumulator, IAC, is at locations &2A-&2D (least significant byte first) and the floating point accumulator, FPAC, occupies the locations &2E-&35.

Notice that this comprises eight locations, rather than the five used to store a floating point variable. This is because the accumulator is an expanded version of the number which makes calculations quicker. Routines exist in the Basic ROM to "pack" these eight bytes into a variable.

The routine to convert the string at &600 into a number is at address &AC34 (&AC5A.). It assumes that the strLen at &36 has been set up correctly. When it returns, the VAL of S&600 is in the FPAC if the minus flag is set (and A contains &FF) or the IAC if the minus flag is 0 (and A = &40).

Note that the routine only converts decimal numbers. To convert hex

→

Datapen

CIRKWIK is a lightpen or tracker ball driven CAD package orientated to the production of schematic drawings such as circuit diagrams, flow charts, power systems, pipework diagrams and many similar professional and engineering applications.

Using this program you can turn your BBC micro into a powerful CAD system capable of producing high quality drawings easily and quickly. An ordinary 80 column dot-matrix printer is all that is required for output and a unique graphics routine allows a multiple screen drawing to be printed in one pass.

Drawings up to 2 screens high by 4 screens wide may be produced and new symbolic shapes may be created on an enlarged scale even while the drawing is in progress. Up to 640 symbols may be used at any time and the package is delivered with over 150 symbols pre-programmed, although these are mainly electronic symbols and may be overwritten to be used for any type of schematic drawing. Parts lists of symbols used may be generated and printouts can be obtained of the unlimited symbol libraries.

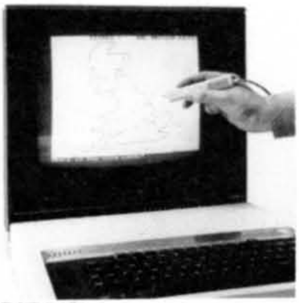
The package is available in three versions: Datapen Lightpen version; trackerball version and a Grafpad version. Both the latter also include the lightpen version on the same disc, enabling a low-cost introduction into CAD. The drawings produced on any version are completely interchangeable and the difference between versions is one of speed of drawing.

CIRKWICK

The MARCONI RB2 TRACKER BALL provides precise X-Y cursor control by simple fingertip operation. It plugs into the user port on the BBC micro and comes complete with Micro-Draw, a superb graphics design program and utilities to link the tracker ball software with your own programs.

The ATARI TRAK-BALL and AMX MOUSE are also usable with CIRKWICK provided the correct connections are made to the user port and Datapen provides an interface to suit at only **£13.00.**

BEEBPEN



BRITAIN

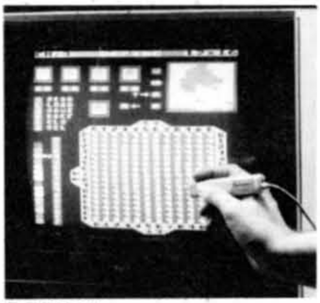
BEEBPEN is a comprehensive high resolution drawing program for use with the Datapen lightpen. It enables you to create, edit and save, virtually any picture that could be made using the BBC computer's advanced graphics facilities. In addition it offers freehand painting, use of all plot commands, circles and user defined graphics. A unique two-step action allows single pixel accuracy and the pixel position is also displayed digitally in the menu.

DEFINE is a suite of programs providing all the sprite and animation facilities needed to produce high speed arcade type games using your own multicoloured characters (sprites).

The package is extremely easy to use, every command being made with a lightpen, or analogue joystick, directly from the screen. Real size and enlarged views of your sprites are continuously updated while you define or edit them and you may test animation sequences in the editor package as you go along. New sprites may be created by editing old versions and the number of sprites you may define is unlimited. Sprites may be any size up to 12 × 16 pixels and each pixel may have any of the 16 standard mode 2 colours. The software needed to animate your sprites is provided as a separate program, which you can merge into your own BASIC, or machine code, program, allowing high resolution positioning with fast, simple commands. The number of sprites, or clones, you may have at any one time is unlimited (except by computer memory) and the speed of movement can be very fast if desired – over 400 sprites per second may be printed from BASIC, or 700 per second from machine code. Of course, you may link sprites in your own programs, producing giant sprites, or sub-animation. A 24 page handbook is supplied as well as a BASIC example program.

TELETEXT DISPLAY CREATOR allows the busy program writer to quickly create displays in colour graphics and text using a lightpen directly on the screen. As only 1K of memory is used per picture, a complete program could call up many different screens, thus making animation easily possible and routines are provided that will produce a complete animated program with the addition of only a few lines of BASIC. Full instructions are provided, as is a description of how teletext pictures are generated.

BRITAIN is a simple lightpen operated geographical location program and comes complete with a series of tests for the student concerning the location of places in the British Isles. A feature of the program is that it self adjusts for new test, the lecturer merely adds a series of Data statements to the program.



DEFINE

Teletext
Display
CREATOR

TELETEXT DISPLAY CREATOR

The DATAPEN LIGHTPEN itself comes complete with software on tape, handbook and a printed listing showing useful routines. Two drawing programs, SKETCH and SHAPE-CREATE are included free with the lightpen and the programs shown above may be ordered additionally or separately as desired.

The Datapen lightpen contains compact electronic circuitry built into the pen body, providing a superior performance and a professional quality product.

Please send your cheque/P.O. to:

Dept. MU2 Datapen Microtechnology Ltd,
Kingsclere Road, Overton,
Hants. RG25 3JB. Tel: (0256 770488)

S.A.E. FOR FURTHER DETAILS

ORDERING INFORMATION

All prices include VAT and postage.

CIRKWIK lightpen only	*disc* **£19.95**
CIRKWIK trackerball/lightpen	*disc* **£24.95**
CIRKWIK Grafpad/lightpen	*disc* **£24.95**
DEFINE Sprite Animator/Editor	*disc* **£11.95**
DEFINE Sprite Animator/Editor	*cassette* **£9.95**
TELETEXT Display Creator	*cassette* **£9.95**
BEEBPEN Drawing Program	*cassette* **£11.95**
Britain Geography Quiz	*cassette* **£6.95**
DATAPEN Lightpen	**£25.00**
MARCONI Tracker Ball (with Micro-Draw)	**£59.50**
ATARI Trak-Ball with BBC interface	**£33.00**

Please deduct £1.50 off each program if more than 1 ordered.

Program I

```
 1000 REM Routine to show BASIC's IO
routines
 1010 REM Pete Johnson
 1020 DIM code 100
 1030 PROCinit
 1040 FOR pass=0 TO 2 STEP 2
 1050 P%=code
 1060 [ opt pass
 1070 .entry
 1080   jsr vstring      Print the pr
ompt
 1090   opt FNequs("Type a string  ")
 1100   nop
 1110   jsr input        Call BASIC's
 input routine
 1120   sty strLen       Save for pri
nting
 1130   jsr vstring      Print anothe
r message
 1140   opt FNequs("You typed  ")
 1150   nop
 1160   ldx #0           &600,X is th
e next character
 1170   ldy strLen       Get count ba
ck again
 1180 .loop
 1190   dey              Do test at t
he top in case of null string
 1200   cpy#&FF
 1210   beq endLoop
 1220   lda strBuff,X    Get a charac
ter
 1230   jsr oswrch       Print it
 1240   inx              Next charact
er
 1250   bne loop         Always taken
 1260 .endLoop
 1270   jsr osnewl       Print a blan
k line
 1280   jsr osnewl
 1290   jmp entry        And do it al
l again
 1300 ]
 1310 NEXT
 1320 CALL code
 1330 END
 1340 DEF PROCinit
 1350   input   = &BBFC  :REM  Input
string to buffer
 1360   vstring = &BFCF  :REM  Print
a message
 1370   oswrch  = &FFEE  :REM  Output
 a character
 1380   osnewl  = &FFE7  :REM  Print
a new line
 1390   strBuff = &600   :REM  Addres
s of string buffer
 1400   strLen  = &36    :REM  Length
 of string in buffer
 1410 ENDPROC
 1420 DEFFNequs(string$)
 1430 $P%=string$
 1440 P%=P%+LEN($P%)-1
 1450 =pass
```

Basic I changes

```
 1350   input   = &BC17  :REM  Input
string to buffer
 1360   vstring = &BFCB  :REM  Print
a message
```

From Page 117

constants into binary, another routine at &AE6D (&AE9C) must be used.

The entry conditions for this are that the pointer at &19-&1A contains the address of the string buffer (ie &600) and &1B contains the displacement into the buffer of the first digit of the number.

Thus if &600 were "&AA" then &19-&1A would contain &600 and &1B would contain 1. On exit, the IAC contains the number and A=&40 and the N flag = 0.

To show all of these routines in action, Program II takes input from the user and converts the string into a number. It then prints the contents of the IAC or FPAC, as appropriate, as a sequence of hexadecimal numbers.

By running the program and typing a few numbers you should be able to work out what's going on. Notice that illegal numbers are always converted into the real number 0.

The meanings of the eight FPAC bytes are (left to right):
sign (&80 means negative)
exponent overflow
exponent (128 + actual exponent)
four bytes of mantissa (MSB first)
mantissa overflow

Note that the overflow bytes are always zero after a simple number conversion.

So much for simple numbers. What about expressions? As I mentioned earlier, there is a routine corresponding to EVAL which will take a general Basic expression and convert it to a number or string.

I'll use this to illustrate the use of number to string conversion. Program III reads an expression, evaluates it, then prints the value.

If the expression evaluates to a string, as STRING$(20,"<>") would, it is printed immediately, otherwise it is converted into a number.

The important routines are:

Eval: This takes the string in StrBuff and evaluates it by running the Basic expression evaluator on it. It returns a result in either the IAC, the FPAC or the StrBuff, depending on the type of expression. The 6502 flags (and the value of A) give the type of the result:

N=1, Z=0, A=&FF => real result
N=0, Z=0, A=&40 => integer result
N=0, Z=1, A=&00 => string result

The routine is at address &ABEE (&AC17).

Str: This is roughly equivalent to the STR$ function. It takes a number in the IAC or FPAC and converts it to a string in strBuff. On entry Y contains the type of the number (&40 or &FF) and location &15 contains &FF if the conversion is to be into hex, &00 for decimal.

When converting the current value of the @% variable is taken into account (except for field width: there are no leading spaces in the converted string).

On exit, the string buffer contains the string that would be printed by a PRINT statement and strLen contains the length of the string. A contains &00 and the zero flag is set, implying that the result of the operation was a string.

The Str routine is at address &A3E4 (&A3F2).

Program III accepts an expression, evaluates it and then prints the result.

You can type any Basic expression in response to the prompt, and it will be evaluated and printed. Note that all the errors associated with expressions, '-ve root', 'No such variable' and so on, can still occur and will cause the program to return to Basic.

You can also get out of the program by pressing Escape.

In the next article I'll look at getting the values in the three accumulators into variables of the appropriate type (and vice versa). I'll also examine some of the routines that can be used from machine code to perform operations on values such as INT and LOG.

⟶

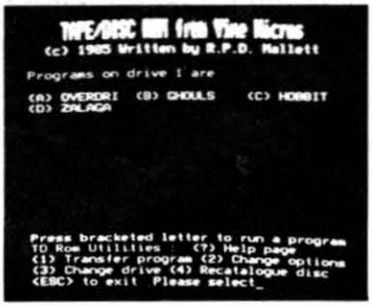
EVAL listing

From Page 119

Program II

```
 1000 REM Routine to show BASIC's str
ing conversion routines
 1010 REM Pete Johnson
 1020 DIM code 100
 1030 PROCinit
 1040 FOR pass=0 TO 2 STEP 2
 1050 P%=code
 1060 [ opt pass
 1070 .entry
 1080   jsr vstring       Print the pr
ompt
 1090   opt FNequs("Type a number  ")
 1100   nop
 1110   jsr input         Call BASIC's
 input routine
 1120   sty strLen        Save for VAL
 1130   lda #0            Set up expre
ssion pointer
 1140   sta aeline
 1150   sta aecursor
 1160   lda #strBuff DIV &100
 1170   sta aeline+1
 1180   jsr getChar       Read a non-s
pace from the line
 1190   cmp #ASC"&"       Hex?
 1200   beq convertHex    Yes
 1210   jsr val           Do a decimal
 conversion
 1220   bne printIt       Always taken
 1230 .convertHex
 1240   jsr hexNum        Convert numb
er at (aeline),aecursor
 1250 .printIt
 1260   bpl fourBytes     Integer, so
print four bytes
 1270   ldx #8            Real, output
 8 bytes
 1280   ldy #fpac         From the fpa
c
 1290   bne outBytes
 1300 .fourBytes
 1310   ldx #4            Integer, out
put 4 bytes
 1320   ldy #iac          From the iac
 1330 .outBytes
 1340   lda 0,Y           Get a byte
 1350   jsr outHexS       Print it, th
en a space
 1360   iny
 1370   dex               Next byte
 1380   bne outBytes
 1390   jsr osnewl
 1400   jsr osnewl
 1410   jmp entry         Do it again
 1420 ]
 1430 NEXT
 1440 CALL code
 1450 END
 1460 DEF PROCinit
 1470   getChar  = &8ABC :REM  Read a
 char from (&19),&1B
```

TD ROM©



```
TAPE/DISC ROM from Vine Micros
(c) 1985 Written by R.P.D. Mallett

Programs on drive 1 are

(A) OVERDRI  (B) GHOULS    (C) HOBBIT
(D) ZALAGA

Press bracketed letter to run a program
TD Rom Utilities  :  (?) Help page
(1) Transfer program (2) Change options
(3) Change drive (4) Recatalogue disc
<ESC> to exit  Please select_
```

- Instant access.
- Allows use of all available RAM, (&400 to &7FFF).
- Can handle any length of program.
- Can handle any number of programs.
- Can save to any disc.
- Very user-friendly, (menu driven).

Tape to Disc Transfer

Now for Single and Double Density

Price £18.00 (inc VAT and post)

- Contains two transfer routines to ensure effective loading of all but a few currently available software tapes.
- Adventures normally taking six minutes to load will now take about five seconds.
- The system automatically switches to TAPE filing after loading, so that you can still load/save games positions, etc.

BBC 'B'

```
TAPE/DISC ROM from Vine Micros
(c) 1985 Written by R.P.D. Mallett

Disc prog filename

Last block loaded

      Load address  :
      Run  address  :
      Block length  :
      Block byte    :

   ACIA error          File locked
   Bad header          Last block
   Bad data            2400 Hz
   Wrong block         Data found
   Rewind cassette !   Empty block

Filename that program will be saved
under ? _
```

- Available to suit these Disc Filing Systems, (state type when ordering).
- Type 8271 – Acorn DFS and DNFS, Amcom S/D and Watford S/D.
- Type 1770 – Opus DDOS 3.45 and Solidisk DDOS, (working in single density).

N.B. This ROM solely provides convenience in loading, and does not break software protection.

Also: The **ADDCOMM** ROM
40 new commands for the BBC 'B' O.S. 1.20 and Electron computer with ROM board. GRAPHICS, TOOLKIT, LOGO GRAPHICS and GENERAL PURPOSE statements all on one ROM.

£28.00 with 72 page User Guide, (including V.A.T. and post). Or send stamp for detailed brochure.

Vine Micros

Available from:

VINE MICROS, MARSHBOROUGH,
NR. SANDWICH, KENT,
CT13 0PG
(Or your local Computer Dealer)

```
 1480   val      = &AC34 :REM  Get VA
L$&600
 1490   hexNum   = &AE6D :REM  Conver
t hex num at (&19),&1B
 1500   outHexS  = &B562 :REM  Print
A in hex
 1510   input    = &BBFC :REM  Read s
tring
 1520   vstring  = &BFCF :REM  Print
string
 1530   oswrch   = &FFEE :REM  Output
 char
 1540   osnewl   = &FFE7 :REM  Do new
line
 1550   strBuff  = &600  :REM  Addres
s of string buffer
 1560   aeline   = &19   :REM  Expres
sion pointer
 1570   aecursor = &1B   :REM  Cursor
 into line
 1580   iac      = &2A   :REM  Intege
r result
 1590   fpac     = &2E   :REM  FP res
ult
 1600   strLen   = &36   :REM  LEN$&6
00
 1610 ENDPROC
 1620 DEFFNequs(string$)
 1630 $P%=string$
 1640 P%=P%+LEN($P%)-1
 1650 =pass
```

Basic I changes

```
 1470   getChar  = &8A13 :REM  Read a
 char from (&19),&1B
 1480   val      = &AC5A :REM  Get VA
L$&600
 1490   hexNum   = &AE9C :REM  Conver
t hex num at (&19),&1B
 1500   outHexS  = &B56A :REM  Print
A in hex
 1510   input    = &BC17 :REM  Read s
tring
 1520   vstring  = &BFCB :REM  Print
string
```

Program III

```
 1000 REM Routine to show BASIC's EVA
L routine
 1010 REM Pete Johnson
 1020 DIM code 100
 1030 PROCinit
 1040 FOR pass=0 TO 2 STEP 2
 1050 P%=code
 1060 [ opt pass
 1070 .entry
 1080   jsr vstring       Print the pr
ompt
 1090   opt FNequs("Type an expressio
n ")
 1100   nop
 1110   jsr input         Call BASIC's
 input routine
 1120   sty strLen        Save for pri
nting
 1130   jsr eval
 1140   tax               Save type by
te
 1150   jsr vstring       Print anothe
r message
 1160   opt FNequs("Value was  ")
 1170   nop
 1180   txa               Restore type
 byte
 1190   beq stringResult Already a st
ring
 1200   tay               Convert numb
er to string
 1210   jsr str
 1220   lda pwidth        Print leadin
g spaces
 1230   sec
 1240   sbc strLen        See how many
 spaces to print
 1250   bcc endSpaces     None
 1260   beq endSpaces     None
 1270   tax               Put count in
 X
 1280   lda #ASC" "       and space in
 A
 1290 .spaceLoop
 1300   jsr oswrch
 1310   dex
 1320   bne spaceLoop
 1330 .endSpaces
 1340 .stringResult
 1350   ldx #0            &600,X is th
e next character
 1360   ldy strLen        Get count ba
ck again
 1370   beq endLoop       Null string
 1380 .loop
 1390   lda strBuff,X     Get a charac
ter
 1400   jsr oswrch        Print it
 1410   inx               Next charact
er
 1420   dey
 1430   bne loop
 1440 .endLoop
 1450   jsr osnewl        Print a blan
k line
 1460   jsr osnewl
 1470   jmp entry         And do it al
l again
 1480 ]
 1490 NEXT
 1500 CALL code
 1510 END
 1520 DEF PROCinit
 1530   str      = &9EDF  :REM  Conver
t number to string
 1540   eval     = &ABEE  :REM  Evalua
te expression in strBuff
 1550   input    = &BBFC  :REM  Input
string to buffer
 1560   vstring = &BFCF   :REM  Print
a message
 1570   oswrch  = &FFEE   :REM  Output
 a character
 1580   osnewl  = &FFE7   :REM  Print
a new line
 1590   pwidth  = &400    :REM  LSB of
 @% variable
 1600   strBuff = &600    :REM  Addres
s of string buffer
 1610   strLen  = &36     :REM  Length
 of string in buffer
 1620 ENDPROC
 1630 DEFFNequs(string$)
 1640 $P%=string$
 1650 P%=P%+LEN($P%)-1
 1660 =pass
```

Basic I changes

```
 1530   str      = &9ED0  :REM  Conver
t number to string
 1540   eval     = &AC17  :REM  Evalua
te expression in strBuff
 1550   input    = &BC17  :REM  Input
string to buffer
 1560   vstring = &BFCB   :REM  Print
a message
```

This listing is included in this month's cassette tape offer. See order form on Page 189.

Tear a strip off Basic line numbers

ROBERT GRIFFITHS shows how a word processor can be used to save time and effort in assembly language programming

WHEN using the Basic assembler, do you feel crowded, inconvenienced, and generally bullied around by those stubborn Basic line numbers?

Well now is the time to liberate yourself. Here is a simple, but extremely effective, idea to enable you to get your own back on them.

If you own Wordwise or any othe word processor that can produce spooled Ascii text, then read on – otherwise get yourself one and then read on.

The following technique allows you to type in an assembly language program without using a single Basic line number. In this way the full facilities of your word processor can be used to produce the program as if you were typing in normal text.

When it comes to editing, or chopping and changing of any description, this little trick has saved me hours of programming time and added weeks, or months, or even eons, to the life of my nervous system.

The technique could also be used to produce Basic programs by those fanatics who advocate 100 per cent "no GOTO" structured programming.

To type in a new program, enter the word processor and at the top of your "document" put:

```
NEW
AUTO
```

Now type in your program as before but don't use any line numbers at all. When finished, or when you want to try assembling the program so far, just save the file as a SPOOLed text file (called "name"), go back to Basic and type:

```
*EXEC name
```

Because of the NEW and AUTO commands at the start of your file the EXECing will produce a normal line-numbered Basic program. After the last line of text has appeared press the Escape key in order to leave the AUTO mode.

You can now use the source code as usual, correcting any assembly errors or making any minor amendments in the normal way.

If the line-numbered copy is adjusted then we can't just go straight back to our text copy and continue adding to that because in doing this we would lose the amendments. In order to continue from here the amended copy must be SPOOLed and then stripped of its line numbers, thus producing an amended text copy. This is the function that the Stripper program serves.

The program should also be used to convert any existing "line-numbered" code into the text format. Thus any amendments to existing programs, incorporation of those old faithful subroutines in the present masterpiece, or re-arrangements of any description, can all be done with comfort and pleasure on your word processor.

In order to use Stripper it must have been previously assembled and saved. Just type in or load the listing and RUN it. A machine code file called strip will then be saved to disc or cassette.

There are two versions of the program. Either can be used by disc owners, but only the cassette version by cassette owners.

For disc owners the strip file is under two pages long and should be saved to every disc that is likely to need it.

Call it with *STRIP name, where name is the name of the SPOOLed file that is to be stripped. But as an alternative to this disc users could use the cassette version and then only one copy of the file will need to be saved. In this case call it with *STRIP.

Cassette users should SAVE the strip file to a short tape so that it can be quickly found. Call with *RUN STRIP, or if the program is already in memory and has not been corrupted, call with CALL&B00.

When you're ready to do some stripping, your victim (the source code) will be lying around in the micro's memory looking all smug and pleased with itself. Ha ha, a programmer's revenge lurks. Grab it by the ankles and SPOOL it onto disc by typing:

```
*SPOOL name
LIST
(The text file is now saved)
*SPOOL
```

The smug look will turn to one of mild concern at this point: "Hooo, what's going on here then? I like it where I am!"

Now while it's still unawares, type in your devastating message (disc users):

```
*STRIP name
```

"Ahhhrrr, what's happening to my line numbers? I want to be a Basic program again!"

Just ignore the screams emanating from your micro and wallow in that sweet, sweet, revenge.

The spooled file is now stripped of line numbers and all spaces on either side of the line numbers. If, however, there were any lines which contained nothing but spaces then these are left with one space remaining. This is done so as to keep any gaps which were placed in the listing for the purpose of clarity.

The NEW and AUTO commands have been added to the beginning of the spooled file and any lines which started with > have been removed from the beginning and end of the file.

This last feature removes the >LIST and any other commands from the beginning, and the >*SPOOL and any following lines from the end of the file.

Listing I is the disc version. Replace lines 210 to 280 with listing II and delete line 490 for use with cassettes.

Normally the stripped file is saved with the same name as the spooled file. Listing III is a small addition to the program that changes the first character of the spooled filename with a ! and then saves the stripped file under this new name.

This addition is intended for use with the cassette version in order to avoid any confusion that might arise in having two different files with the same name on the same tape.

The program uses the EQUate facility provided by Basic II. To convert for Basic I these must all be replaced.

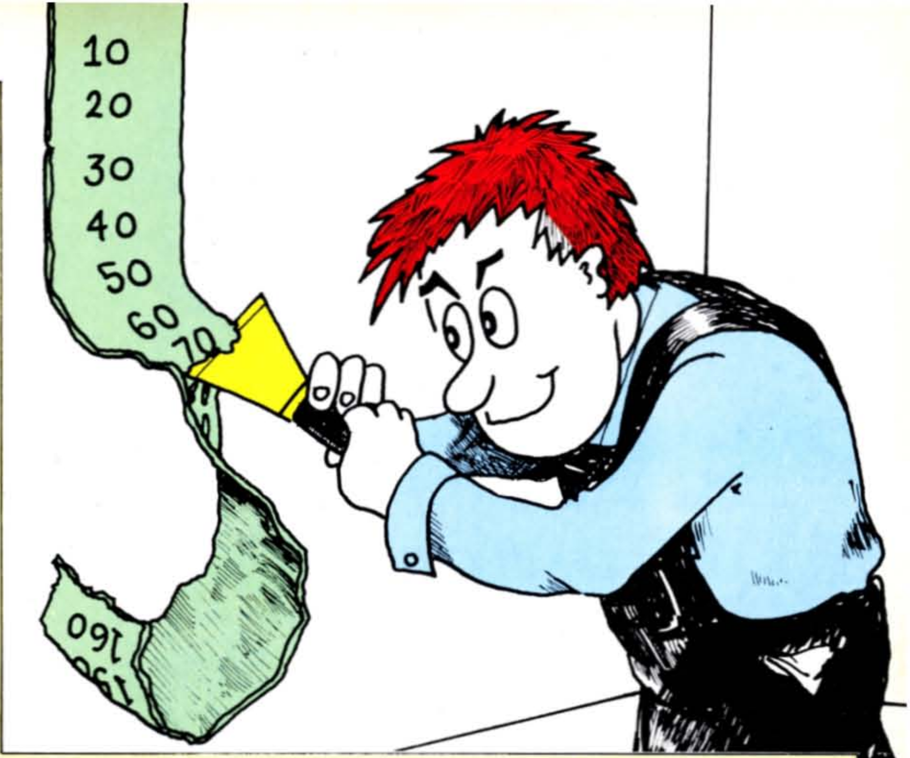
Refer to *The Micro User*, Jan '85 page 93, for details of how to do this.

Alternatively replace the program lines concerned with the conversions given in Listing IV, lines 273-276 of which should only be added if you are using cassettes.

If you keep getting the message "This is not a text ASC file" when you try to strip a spooled Basic program, and your SPOOLed file is over 255 bytes in length, delete line 490. This deletes the check which determines whether the file is a Basic program or a spooled text file.

On some disc systems, other than Acorns, this check will fail. Deleting line 490 solves the problem.

The program assembles into pages &B and &C, the soft key buffer and user defined character area. Therefore when the program is used any soft key definitions or user defined characters will be lost.



DISC VERSION

210-280 Get address of filename from the operating system (OS). Whenever the OS gets a command that it does not recognise – in our case *STRIP name – it sets up the contents of &F2,&F3 plus an offset held in the Y register to point to the start address in memory where the command is stored. This information is then passed to each paged ROM in turn to see if they can recognise it. If none of these little fellows claims it then it is passed on to the disc filing system for scrutiny.

The DFS will recognise the STRIP part of the command as a filename and will look for this file. In our case the file will be found. The DFS will then increment the Y register past the part of the command that it has recognised and then LOAD and RUN the file (also signalling to the OS that the command has been fully dealt with).

At this point our strip code is entered with (&F2), Y now pointing to the name part of the original command. This gives us the name of the file to be stripped.

CASSETTE VERSION

210-234 Output message specified at line 274.

236-240 Flush keyboard buffer.

242-266 Set up parameter block and use OSWORD &00 call to input filename (User Guide, page 459).

BOTH VERSIONS

300-410 Get the default value of PAGE from the OS and use it to set up the load address of the file to be stripped (file_in is set 11 bytes higher than file_out in order to leave room to add the NEW and AUTO commands).

420-440 Set up the OSFILE parameter block and load the file (User Guide page 455).

450-490 Check that it is not a Basic file.

500-570 Check that the file contains text Ascii values only (only the first page is checked). This section has been included to spot any machine code or data files because if these files are stripped by accident the results could be disastrous.

If, however, you are in the habit of including teletext control characters within quotation marks in your source code or Basic then these files will be rejected as well. To overcome this change line 560 to:

```
560 LDA #0
```

580-640 Output error message and stop (only if the file type is not correct).

650-720 Get length of file from the parameter block (this is placed there by the OSFILE call) and use it to set up the end pointer.

730-780 Place NEW and AUTO at the start of the file.

790-990 Move past any lines beginning with > and set up the "get" pointer.

1000-1080 Set up the "put" pointer and jump into the main loop.

1090-1370 The main program loop.

1100-1130 Increment get.

1140-1170 Increment put.

1180-1220 If get > end then end of file is reached.

1230-1240 Contents of put = contents of get.

1250-1370 If an end of line has been reached then Call delete. If the following line begins with > then end of file is reached. Repeat loop.

1380-1430 Control arrives here when end of file is reached. Save the stripped file and return to Basic.

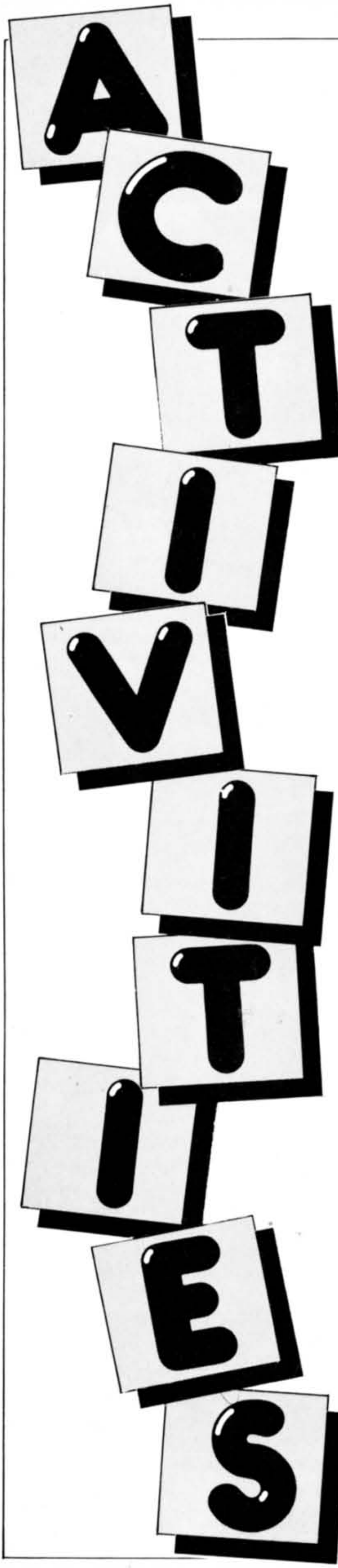
1450-1870 delete: This subroutine is entered at the start of each line and increments the get pointer past the line number and any surrounding spaces so that these are not transferred down to the put pointer.

This method is an extremely efficient way of selectively weeding out unwanted data, since in the whole process each piece of wanted data is only moved once and no piece of unwanted data is moved at all.

The technique is known as the "no coffee" method because you don't have to get up to make a cup of coffee while the sorting is going on.

1890-2100 set_pblock: This subroutine sets up the parameter block for the OSFILE operations. The block is 18 bytes long and is placed in memory directly following the machine code. Page 455 of the User Guide gives details of the block's contents.

Turn to Page 156



Powers of observation and association are put to the test in this educational program by MIKE PLUMMER

As it stands Activities is an educational program for use by younger school children. It could, however, be modified so that it could be an asset to older children as well.

It has been used by the teachers at my children's school and they tell me it is useful and well liked (although maybe they're just being polite).

The idea is to test a child's powers of observation and association.

The micro selects a random activity from a list and draws some items on the screen which are associated with that activity. It also draws some irrelevant items.

The child's task is to decide which items are relevant and select them by pressing number keys 1 to 6.

If the selected item is relevant then it's ticked and the computer plays a chord. Otherwise the drawing is crossed out and the computer makes a rude noise.

When the child thinks that he or she has all of the right items selected then they can press the F key, whereupon the computer will assess how well they have done.

Any drawings which should have been selected but were not are left on the screen, along with a comment. All irrelevant or correctly selected ones are rubbed out.

After 10 activities (none of which are the same), a score sheet is printed and another turn is invited.

The initial instruction page can be returned to at any time by pressing the Escape key and the sound effects can be turned on or off whenever the computer is expecting a key to be pressed.

Although this all sounds very daunting, in fact most children seem to be able to use the program easily and enjoy doing so.

The program was originally written on an Electron, but will run equally well on the BBC Micro.

Also, because memory is at such a premium in the otherwise superb BBC/Electron computers, the variable and procedure names are rather cryptic.

Because of the way the program works, ***it is essential that you do not renumber it,*** or at least the DATA statements at lines 10000 onward.

At this juncture it's worth outlining how the program functions.

I have seen many programs of a similar nature which require access to a set of data in a random way – spelling games or Hangman spring to mind.

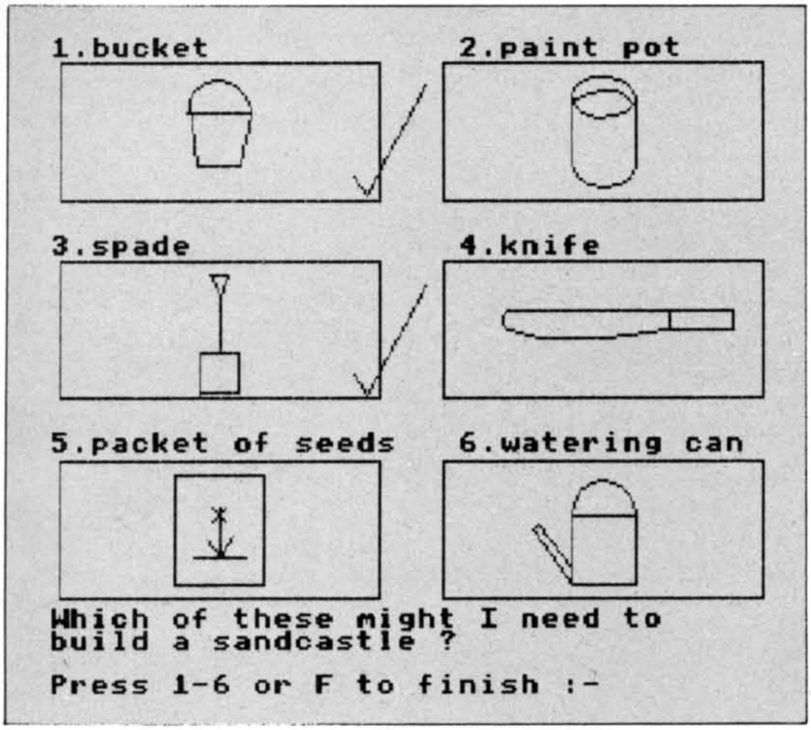
Most programmers seem to access the data in a random way by READing the data into a string array then generating a random number to be used as an array index.

Doing this means that there are two copies of the data in the aforementioned limited Acorn memory.

Because it is possible in BBC Basic to use the RESTORE statement using a variable or an expression rather than a line number, any DATA statement can

Activities listing

```
   10 REM ACTIVITIES
   20 REM (C) The Micro User
   30 REM by M.ke Plummer
   40 ON ERROR GOTO 1420
   50 MODE 6:PROCSETUP
   60 DIM AN%(5),QU%(5):LST$=STRING$(
40,"#"):ITEM$=LST$
   70 CLS:PRINT TAB(5,10)"Wait a minu
te, I am thinking":VDU 23,1,0;0;0;0;
   80 RESTORE 10000:LC%=-1:REPEAT LC%
=LC%+1
   90 REPEAT READ LST$:UNTIL LST$="#"
 OR LST$="*":UNTIL LST$="#"
  100 RESTORE 20000:IC%=-1:REPEAT IC%
=IC%+1
  110 REPEAT READ ITEM$:UNTIL ITEM$="
#" OR ITEM$="*":UNTIL ITEM$="#"
  120 REPEAT:RI%=0:WR%=0:TT%=0:MODE4:
VDU19,0,4;0;23,1,0;0;0;0;:FOR TEST=0
TO 9:CLS:PROCASK:PROCANS:NEXT:MODE6:V
DU19,0,4;0;23,1,0;0;0;0;:PROCSC:UNTIL
 FALSE
  130 :
  140 REM -- Get a set of items + som
e random ones --
  150 DEF PROCASK:LOCAL N1%,N2%:FOR N
1%=0 TO 5:QU%(N1%)=-1:AN%(N1%)=-1:NEX
T:H%=TRUE
  160 REPEAT T%=TRUE:N1%=RND(LC%):FOR
 IC%=0 TO 9:IF N1%=ST%(IC%) T%=FALSE
  170 NEXT:UNTIL T%
  180 ST%(TEST)=N1%
```



```
Which of these might I need to
build a sandcastle ?

Press 1-6 or F to finish :-
```

be READ by setting the value of the variable to the line number of the DATA statement that you want.

It looks tricky, but in fact is very easy. This means that you must be careful how you number the DATA statements.

Finally, to save memory space and speed up the drawing process a bit, the resident integer variables have been used to some degree.

As I have already hinted, it is possible to add extra activities and drawings to the list or create a completely different one.

To create a new activity you must add a new DATA statement as follows (numbers are counted from 0):

```
100nn DATA activity name,n1,n2...ni
,*
```

where nn is the number of the activity and n1,n2 etc are the numbers of the associated items.

There can be from one to six items in the list. The asterisk at the end is to tell the computer there are no more items in the list.

Line 19999 with the hash sign must be present to show there are no more lists. Each individual drawing is defined as shown:

```
200nn DATA item name,M,x,y,D,x,y,E,
x,y,r1,r2,a1,a2......,*
```

where nn is the item number and x and y are the coordinates of a 500 x 200 grid on which the item is drawn. The graphics interpreter reads these codes as follows:

M,x,y: Moves the graphics cursor to x,y without drawing.

D,x,y: Draws a line to x,y from the last graphics point.

E,x,y,r1,r2,a1,a2: Draws part of an ellipse with centre *x,y,* radii *r1,r2* starting at angle *a1* and finishing at angle *a2*.

The angles are measured in radians and increase anti-clockwise with 3 o'clock being zero.

These codes may be in any order, but there is no error trapping, so they must be correct.

The asterisk at the end of the statement is to indicate the end of the drawing. If the codes will not all fit into one DATA statement they may be continued into another one, although the line number for this must be less than 10 more than the initial one (for example, see lines 20100 and 20102).

The final DATA statement with the indicates no more drawings are present, and it must be there.

If some clever dick of a little Johnnie points out that a so called irrelevant item goes with an activity, just add its number to the activity list.

```
  190 RESTORE (9999+N1%):READ LST$:NA
NS%=0:REPEAT READ ITEM$:IF ITEM$<>"*"
 THEN AN%(NANS%)=VAL(ITEM$):NANS%=NAN
S%+1
  200 UNTIL ITEM$="*"
  210 FOR N1%=NANS% TO 5:REPEAT:SAME%
=FALSE:QST%=RND(IC%)-1:FOR N2%=0 TO 5
:IF AN%(N2%)=QST% THEN SAME%=TRUE
  220 NEXT:UNTIL NOT SAME%:AN%(N1%)=Q
ST%:NEXT
  230 FOR N1%=0 TO 5:REPEAT QST%=RND(
6)-1:UNTIL QU%(QST%)=-1:QU%(QST%)=AN%
(N1%):NEXT
  240 FOR N1%=0 TO 5:PROCDRITEM(N1%):
NEXT:TT%=TT%+NANS%:NANS%=NANS%-1
  250 KP$=""
  260 PRINT TAB(1,27);"Which of these
 might I need to"'" ";LST$+" ?"
  270 ENDPROC
  280 :
  290 REM -- Draw an item (1..6) --
  300 DEF PROCDRITEM(N%):QST%=QU%(N%)
:RESTORE (10*QST%+20000):READ ITEM$:P
RINT TAB(1+(N% MOD 2)*20,1+(N% DIV 2)
*9);N%+1;"."+ITEM$
  310 U%=(N% MOD 2)*600+50:V%=755-(N%
 DIV 2)*290
  320 MOVE U%,V%:PLOT 1,0,200:PLOT 1,
500,0:PLOT 1,0,-200:PLOT 1,-500,0
  330 D$="":REPEAT PROCINTPRT:UNTIL D
$="*"
  340 ENDPROC
  350 REM:
  360 REM -- Interpret graphics code
--
  370 DEF PROCINTPRT:READ D$:D$=LEFT$
(D$,1)
  380 IF D$="E" THEN PROCELL:ENDPROC
  390 IF D$<>"*" THEN READ X%,Y% ELSE
 ENDPROC
  400 IF D$="M" THEN PT%=4 ELSE PT%=5
  410 PLOT PT%,U%+X%,V%+Y%
  420 ENDPROC
  430 :
  440 REM -- Read answer from keys --
```

→

From Page 125

```
  450 DEF PROCANS
  460 AN$="":REPEAT:REPEAT
  470 *FX21,0
  480 PRINT TAB(1,30);"Press 1-6 or F
 to finish :-  "+CHR$(8);:AN$=GET$:IF
 AN$="f" THEN AN$="F"
  490 IF AN$="q" OR AN$="Q" THEN *FX2
10,1
  500 IF AN$="s" OR AN$="S" THEN *FX2
10,0
  510 UNTIL (AN$>="1" AND AN$<="6") O
R AN$="F"
  520 IF AN$="F" THEN PROCENCH ELSE P
ROCNOCH:IF LEN(KP$)=6 AN$="F":PROCENC
H
  530 UNTIL AN$="F":ENDPROC
  540 :
  550 REM -- Number answer handling -
-
  560 DEF PROCNOCH:ANS%=VAL(AN$)-1:IF
 INSTR(KP$,AN$)=0 KP$=KP$+AN$
  570 IF QU%(ANS%)=-2 THEN SOUND 1,-1
5,192,2:SOUND 1,-15,0,4:ENDPROC
  580 F%=FALSE:FOR N%=0 TO NANS%:IF A
N%(N%)=QU%(ANS%) THEN F%=TRUE:AN%(N%)
=-2:QU%(ANS%)=-2
  590 NEXT:IF F% THEN PROCHEER:MOVE (
ANS% MOD 2)*600+510,790-(ANS% DIV 2)*
290:PLOT 1,20,-30:PLOT 1,90,160:PROCD
EL:ENDPROC
  600 PROCRASP:MOVE (ANS% MOD 2)*600+
50,755-(ANS% DIV 2)*290:PLOT 1,500,20
0:PLOT 0,-500,0:PLOT 1,500,-200:QU%(A
NS%)=-1:H%=FALSE:PROCDEL:ENDPROC
  610 :
  620 REM -- Small delay --
  630 DEF PROCDEL
  640 TIME=0:REPEAT UNTIL TIME=100
  650 ENDPROC
  660 :
  670 REM -- Blow raspberry --
  680 DEF PROCRASP
  690 FOR P%=4 TO 7:SOUND 0,-15,P%,5:
NEXT
  700 IF QU%(ANS%)<>-1 THEN WR%=WR%+1
  710 QU%(ANS%)=-2
  720 ENDPROC
  730 :
  740 REM -- Fanfare --
  750 DEF PROCHEER
  760 RI%=RI%+1
  770 FOR P%=5 TO 20 STEP 15
  780 SOUND 1,-15,53,1
  790 SOUND 1,-15,69,1
  800 SOUND 1,-15,81,P%
  810 TIME=0:REPEAT UNTIL TIME = 25
  820 NEXT:ENDPROC
  830 :
  840 REM -- End of answers handling
--
  850 DEF PROCENCH
  860 F%=FALSE:FOR N%=0 TO 5
  870 G%=TRUE:FOR P%=0 TO NANS%:IF (Q
U%(N%)=AN%(P%)) AND QU%(N%)>-1 THEN G
%=FALSE:F%=TRUE
  880 NEXT P%:IF G% OR QU%(N%)<0 THEN
 LET X%=(N% MOD 2)*20:Y%=(N% DIV 2)*9
:FOR Z%=Y% TO Y%+8:PRINT TAB(X%,Z%);S
PC(20):NEXT Z%
  890 NEXT N%
  900 PRINT TAB(1,27)STRING$(78," ")
  910 PRINT TAB(8,28);:IF F% THEN PRI
NT "     What about this ?" ELSE IF N
OT H% THEN PRINT "You had some wrong
guesses!" ELSE PRINT "     VERY WELL
DONE !"
  920 PRINT TAB(0,30)STRING$(38," ")T
AB(15,30)"Press SPACE":REPEAT UNTIL G
ET$=" ":ENDPROC
  930 :
  940 REM -- Draw an ellipse --
  950 DEF PROCELL:READ X%,Y%,R1,R2,A1
,A2:INC=40/(R1+R2):PLOT 4,R1*COS(A1)+
U%+X%,R2*SIN(A1)+V%+Y%
  960 FOR A=A1 TO A2 STEP INC:PLOT 5,
R1*COS(A)+U%+X%,R2*SIN(A)+V%+Y%:NEXT:
ENDPROC
  970 :
  980 REM -- Display scores --
  990 DEF PROCSC:CLS:PRINT TAB(5,2);"
Your final scores are :-"
 1000 PRINT'" Total number of items w
anted    ";TT%
 1010 PRINT'" Total number of correct
 answers ";RI%
 1020 PRINT'" Total number of wrong a
nswers   ";WR%
 1030 PRINT'" Press SPACE for some on
e else to try"
 1040 *FX21,0
 1050 REPEAT:KEY$=GET$:IF KEY$="q" OR
 KEY$="Q" THEN *FX210,1
 1060 IF KEY$="s" OR KEY$="S" THEN *F
X210,0
 1070 UNTIL KEY$=" ":ENDPROC
 1080 :
 1090 REM Print instructions
 1100 DEF PROCSETUP
 1110 DIM ST%(9)
 1120 *FX18,0
 1130 *FX11,0
 1140 CLS
 1150 VDU 19,0,4;0;23,1,0;0;0;0;
 1160 PRINT:PRINT TAB(15)"ACTIVITIES"
 1170 PRINT '" The computer will deci
de that it wants"
 1180 PRINT "to do something and will
 draw six items"
 1190 PRINT "on the screen, along wit
h their name &"
 1200 PRINT "a number. Some of the it
ems drawn will"
 1210 PRINT "be needed to do whatever
 the computer"
 1220 PRINT "wants to do. You must te
ll it what it"
 1230 PRINT "needs by pressing keys 1
-6.If the item"
 1240 PRINT "is needed then a tick wi
ll be drawn by"
 1250 PRINT "the picture, otherwise i
t will be"
 1260 PRINT "crossed out. You will ha
ve 10 tries"
 1270 PRINT "then the computer will t
ell you your"
 1280 PRINT "score and ask for someon
e else to try."
 1290 PRINT '" Set the sound effects
on by pressing"'"the 'S' key and turn
 them off with the"'"'Q' key. This ca
n be done now or at any"'"time the co
mputer is waiting for a key"'"to be p
ressed. Select now (S/Q) "
 1300 REPEAT:*FX21,0
 1310 key$=CHR$(GET AND &5F)
 1320 UNTIL key$="S" OR key$="Q"
 1330 IF key$="S" THEN *FX 210,0
 1340 IF key$="Q" THEN *FX 210,1
 1350 PRINT '"Press SPACE to start, E
SC for this page";
 1360 *FX21,0
 1370 REPEAT UNTIL GET$=" ":CLS
 1380 FOR IC%=0 TO 9:ST%(IC%)=-1:NEXT
 1390 ENDPROC
 1400 :
 1410 REM -- Error trapping --
 1420 ON ERROR OFF:IF ERR=17 THEN RUN
 ELSE MODE6:REPORT:PRINT " at line ";
ERL:*FX12,0
 1430 END
 1440 :
10000  DATA plant some seeds,0,1,2,*
10001  DATA paint the house,3,4,5,*
10002  DATA have my dinner,6,7,8,16,*
10003  DATA build a sandcastle,0,9,*
10004  DATA go for a drive,10,11,*
10005  DATA go for a sail,12,13,14,*
10006  DATA have a drink of tea,15,16
,17,*
10007  DATA fly in the sky,18,19,20,*
```

```
10008  DATA play cricket,21,22,23,*
10009  DATA tell the time,24,25,26,*
10010  DATA write a story,27,28,29,*
10011  DATA wash the windows,9,4,30,*
10012  DATA do some woodwork,28,31,32
,33,36,*
10013  DATA do some cooking,6,8,34,35
,*
10014  DATA mend the car,10,36,37,32,
38,*
10015  DATA clean my teeth,39,40,41,*
10016  DATA wash my face,42,43,44,45,
*
10017  DATA walk in the rain,46,47,48
,*
10018  DATA do my shopping,49,50,51,*
10019  DATA play a tune,52,53,54,*
10020  DATA go for a swim,13,43,55,*
10021  DATA play football,21,56,57,*
10022  DATA have a party,58,59,60,*
10023  DATA send a letter,28,29,61,62
,63,*
10024  DATA make a phone call,64,65,*
10025  DATA do the washing up,66,67,6
8,69,*
10026  DATA go to bed,70,71,72,*
19999  DATA *
20000  DATA spade,M,220,10,D,280,10,D
,280,70,D,220,70,D,220,5,M,250,70,D,2
50,150,D,235,180,D,265,180,D,250,150,
*
20010  DATA packet of seeds,M,180,20,
D,320,20,D,320,180,D,180,180,D,180,20
,M,210,60,D,290,60,M,250,60,D,250,130
,M,260,130,D,240,110,M,240,130,D,260,
110,M,270,90,D,250,60,D,230,85,*
20020  DATA watering can,M,200,20,D,3
00,20,D,300,120,D,200,120,D,200,20,D,
140,100,D,146,106,D,200,42,E,250,120,
50,50,0,3.34,*
20030  DATA paint brush,M,240,100,D,2
40,190,D,260,190,D,260,100,D,280,80,D
,220,80,D,240,100,M,220,73,D,220,63,D
,210,13,D,290,13,D,280,63,D,220,63,D,
220,73,M,280,73,D,280,63,*
20040  DATA ladder,M,150,10,D,240,190
,M,340,190,D,250,10,M,260,30,D,160,30
,M,170,50,D,270,50,M,280,70,D,180,70,
M,190,90,D,290,90,M,300,110,D,200,110
,M,210,130,D,310,130,M,320,150,D,220,
150,M,230,170,D,330,170,*
20050  DATA paint pot,E,250,150,50,30
,0,6.28,E,250,130,50,30,.15,3,E,250,5
0,50,30,3.14,6.28,D,300,150,M,200,150
,D,200,50,*
20060  DATA fork,M,80,70,D,180,70,D,2
00,90,D,400,90,D,400,110,D,200,110,D,
180,130,D,150,130,D,150,70,M,150,90,D
,80,90,M,80,110,D,150,110,M,150,130,D
,80,130,*
20070  DATA plate,E,250,100,120,50,0,
6.3,E,250,100,100,30,0,6.3,*
20080  DATA knife,M,350,100,D,450,100
,D,450,130,D,100,130,D,90,120,D,90,11
0,D,100,100,D,150,90,D,250,90,D,350,1
00,D,350,130,*
20090  DATA bucket,E,250,125,50,50,0,
3.14,D,215,50,D,285,50,D,300,125,D,20
0,125,*
20100  DATA car,E,150,50,25,25,0,6.43
3,E,350,50,25,25,0,6.433,E,350,50,30,
30,0,3.2,E,150,50,30,30,0,3.2,D,120,5
0,D,100,50,D,120,100,D,200,110,D,225,
150,D,350,150,D,400,100,D,400,50,D,38
0,50,M,320,50,D,180,50
20102  DATA M,300,60,D,210,60,D,210,1
00,D,370,100,D,350,140,D,300,140,D,30
0,60,M,300,140,D,225,140,D,210,100,*
20110  DATA steering wheel,E,250,100,
75,75,0,6.45,D,250,100,D,200,50,M,250
,100,D,200,150,*
20120  DATA boat,M,150,75,D,175,50,D,
350,50,D,400,60,D,400,75,D,150,75,D,2
50,190,D,400,85,D,400,75,M,250,75,D,2
50,190,M,400,85,D,165,85,*
20130  DATA lifebelt,E,250,100,50,50,
0,6.5,E,250,100,75,75,0,6.5,M,325,90,
D,300,90,M,200,90,D,175,90,M,175,110,
D,200,110,M,300,110,D,325,110,*
20140  DATA compass,E,250,100,90,90,0
,6.5,M,250,140,D,240,100,D,250,60,D,2
60,100,D,250,140,M,240,145,D,240,165,
D,260,145,D,260,165,*
20150  DATA teapot,E,250,160,10,10,0,
6.4,E,250,100,50,50,5.5,10.3,M,275,55
,D,225,55,D,150,135,D,160,135,D,200,1
00,M,295,75,D,330,75,D,330,120,D,295,
120,M,280,135,D,220,135,*
20160  DATA mug,E,250,150,50,30,0,6.2
8,E,250,130,50,30,.15,3,E,250,50,50,3
0,3.14,6.28,D,300,150,M,200,150,D,200
,50,M,300,125,D,333,125,D,333,75,D,30
0,75,*
20170  DATA kettle,E,250,100,50,50,0,
3.25,E,250,110,10,10,0,6.4,M,175,25,D
,175,75,D,200,100,D,300,100,D,325,75,
D,325,25,D,175,25,D,115,100,D,130,100
,D,175,55,*
20180  DATA aeroplane,M,150,60,D,250,
60,D,250,80,D,200,80,D,200,60,D,300,6
0,D,400,100,D,150,100,D,150,60,M,135,
60,D,135,120,M,135,90,D,150,90,M,400,
100,D,400,140,D,365,140,D,350,100,M,3
00,100,D,280,125,D,225,125,D,200,100,
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20190  DATA airship,E,250,100,150,50,
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,400,170,D,400,30,D,380,30,D,350,65,M
,300,55,D,285,20,D,220,20,D,200,55,M,
220,42,D,265,42,D,265,30,D,220,30,D,2
20,42,*
20200  DATA balloon,E,250,140,50,50,0
,6.4,M,300,140,D,200,140,D,230,50,D,2
70,50,D,300,140,M,250,140,D,250,50,M,
230,50,D,230,15,D,270,15,D,270,50,*
20210  DATA ball,E,250,100,50,50,0,6.
5,*
20220  DATA cricket bat,M,230,10,D,27
0,10,D,270,140,D,255,150,D,255,190,D,
245,190,D,245,150,D,230,140,D,230,10,
M,245,150,D,255,150,*
20230  DATA wicket,M,220,10,D,220,190
,D,280,190,D,280,10,M,250,10,D,250,19
0,*
20240  DATA sundial,E,250,75,100,25,0
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0,150,*
20250  DATA watch,E,250,100,50,50,0,6
.5,M,275,100,D,250,100,D,250,140,M,29
5,75,D,435,75,D,450,100,D,435,125,D,2
95,125,M,205,75,D,50,75,D,50,125,D,20
5,125,M,75,125,D,75,75,M,75,100,D,62,
100,*
20260  DATA clock,E,250,100,75,75,0,6
.5,E,250,100,15,15,0,6.8,M,150,15,D,3
50,15,D,350,185,D,150,185,D,150,15,M,
260,110,D,280,130,M,260,90,D,300,50,M
,250,25,D,250,40,M,175,100,D,200,100,
M,250,175,D,250,150,M,325,100,D,300,1
00,*
20270  DATA writing book,E,200,125,75
,35,0.5,2.5,E,300,125,75,35,0.5,2.5,E
,200,25,75,35,0.6,2.5,E,300,25,75,25,
0.6,2.5,M,250,150,D,250,50,M,150,50,D
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20280  DATA pencil,M,150,80,D,400,80,
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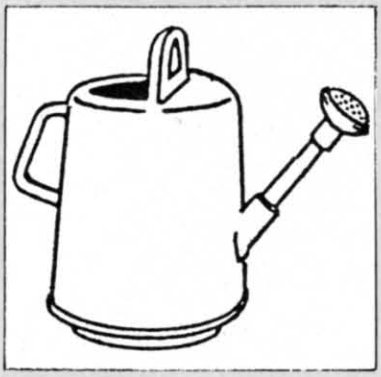

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,D,150,120,M,100,94,D,100,106,M,150.1
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20290  DATA rubber,M,100,100,D,125,75
,D,275,75,D,300,125,D,275,150,D,125,1
50,D,150.125,D,300.125,M,100,100,D,12
5,150,M,150,125,D,125,75,*
20300   DATA washleather,M,200,50,D.3
00,50,D,300,150,D,200,150,D,200.50,*
20310  DATA saw,M,100,100,D,100,50,D,
300.50,D,300,100,D,100,100,D,100,115,
D,300,115,D,325,135,D,365,135,D,365,7
5,D,325,75,D,300,100,D,300,115,M,310,
115,D,330,85,D,350,80,D,350,125,D,325
,125,D,310,115,*
20320  DATA hammer,M,200,85,D,200,135
,D,215,159,D,200,150,D,170,115,D,170.
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10,D,200,110,*
20330  DATA nails,M,150,50,D,210,140,
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0,D,240,150,D,260,150,M,400,100,D,275
,100,D,275,110,D,275,90,M,400.10,D,30
0,50,D,294,40,D,306,60,*
20340  DATA mixing bowl,E,250,150,100
,100,3.14,4.2,M,200,70,D,300,70,M,150
,150,D,350,150,E,250,150,100,100,5.3,
6.30,*
20350  DATA cooker,M,200,10,D,300,10,
D,300,190,D,200,190,D,200,10,M,210,25
,D,290,25,D,290,80,D,210,80,D,210,25,
M,270,70,D,280,70,M,200,100,D,300,100
,M,300,120,D,200,120,M,200,170,D,300,
170,M,210,110,D,215,110,M,247,110,D,2
53,110
20352  DATA M,290,110,D,285,110,*
20360  DATA screwdriver,M,150,90,D,30
0,90,D,300,125,D,400,125,D,400,75,D,3
00,75,D,300,110,D,150,110,D,125.115,D
,100,110,D,100,90,D,125,85,D,150,90,*
20370  DATA oil can,M,45,150,D,200,50
,D,200,150,D,300,150,D,300,65,D,350,6
5,D,350,135,D,300,135,D,300,50,D,200.
50,D,200,65,D,55,150,D,45,150,M,200,1
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0,170,D,350,160,*
20380  DATA spanner,M,50,50,D,100,50,
D,150,80,D,350,80,D,400,50,D,450,50,D
,450,70,D,400,70,D,375,100,D,400,130,
D,450,130,D,450,150,D,400,150,D,350,1
20,D,150,120,D,100,150,D,50,150,D,50,
130,D,100,130,D,125,100,D,100,70,D,50
,70,D,50,50,*
20390  DATA toothpaste,M,125,75,D,50,
75,D,50,125,D,125,125,D,150,150,D,450
,150,D,450,50,D,150,50,D,125,75,D,125
,125,M,150,150,D,150,50,M,440,50,D,44
0,150,*
20400  DATA toothmug,E,250,150,50,20,
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75,50,D,300,150,*
20410  DATA toothbrush,M,100,75,D,200
,75,D,250,100,D,450,100,D,450,110,D,2
50,110,D,200,85,D,100,85,D,100,75,D,1
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134,125,M,150,85,D,150,125,M,167,85,D
,167,125,M,184,85,D,184,125,M,200,85,
D,200,125,*
20420  DATA face flannel,M,200,50,D,3
00,50,D,300,150,D,200.150,D,200,50,*
20430  DATA towel,M,125,50,D,375,50,D
,375,150,D,125,150,D,125,50,*
20440  DATA wash basin,M,150,100,D,35
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,175,125,D,175,150,D,190,150,D,190,12
5,M,325,125,D,325,150,D,305,150,D,305
,125,M,300,150,D,330,150,M,200,150,D,
175,150
20442  DATA E,200,100,50,59,3.14,4.91
,E,300,100,50.59,4.91,6.4,M,200,41,D,
225,41,D,225,0,M,300,41,D,275,41,D,27
5,0,*
20450  DATA soap,E,250,100,150,50,1.1
,2.2,E,250,100,150,50,4.2,5.3,M,175,6
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20460  DATA umbrella,M,150,150,D,350,
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20470  DATA wellingtons,M,150,50,D,20
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20480  DATA raincoat,M,200,20,D,300,2
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70,D,275,175,D,225,175,D,200,170,D,14
0,75,D,160,70,D,200,125,D,200,20,M,25
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250,120,D,290,175,D,275,175,D,250,125
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20490  DATA money,M,150,50,D,150,100,
D,250,100,D,250,50,D,150,50,E,300,100
,25,25,0,6.44,E,275,150,20,20,0,6.33,
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20500  DATA shopping list,M,200,10,D,
200,175,D,300,175,D,300,10,D,200,10,M
,220,150,D,280,150,M,220,110,D,260,11
0,M,220,80,D,240,80,M,220,60,D,275,60
,M,220,40,D,240,40,M,220,20,D,260,20,
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20510  DATA shopping bag,M,150,25,D,3
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20520  DATA music book,M,250,50,D,250
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20530  DATA drum,E,250,125,100,25,0,6
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105,D,150,50,D,150,125,M,100,175,D,22
5,160,M,275,160,D,400,175,*
20540  DATA recorder,E,480,70,30,30,1
.57,3.14,D,400,70,D,50,80,D,20,70,D,2
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480,110,M,450,130,D,450,115,D,430,115
,D,430,130,*
20550  DATA swimming costume,M,150,25
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,400,150,D,375,170,D,350,130,D,325,17
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20560  DATA football boots,M,150,50,D
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90,D,270,90,D,270,40,D,250,40,M,200,7
0,D,170,70,E,170,40,30,30,1.55,3,*
20570  DATA football shorts,M,175,50,
D,235,50,D,250,70,D,260,50,D,325,50,D
,325,125,D,175,125,D,175,50,*
20580  DATA glass of squash,E,250,150
,50,20,0,6.33,E,250,125,40,16,0,6.33,
E,250,50,25,10,0,6.33,M,225,50,D,200,
150,M,275,50,D,300,150,M,225,50,D,275
,125,D,325,160,*
20590  DATA fancy cake,E,250,125,100,
15,0,6.33,E,250,50,100,15,3.14,6.33,D
,350,125,M,150,125,D,150,50,M,190,130
,D,190,160,M,250,140,D,250,170,M,310,
130,D,310,160,*
20600  DATA balloons,E,150,125,30,30,
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0,6.33,M,150,95,D,150,50,E,250,150,45
,45,0,6.33,M,250,105,D,250,50,E,400,1
00,50,50,0,6.53,M,400,50,D,400,10,*
20610  DATA "paper,envelope",M,100,40
,D,200,40,D,200,175,D,100,175,D,100,4
0,M,250,50,D,400,50,D,400,120,D,250,1
20,D,250,50,D,310,75,D,340,75,D,400,5
0,M,400,120,D,340,75,D,310,75,D,250,1
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20620  DATA stamp,M,200,50,D,300,50,D
,300,150,D,200,150,D,200,50,M,250,55,
D,250,70,E,275,60,10,10,0,6.35,M,225,
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,140,D,225,140,D,225,100,D,235,93,D,2
35,86,D,225,75,*
20630  DATA postbox,M,200,10,D,300,10
,D,300,150,D,200,150,D,200,10,M,225,1
20,D,275,120,D,275,135,D,225,135,D,22
5,120,E,250,100,70,70,0.8,2.4,*
20640  DATA phone directory,E,200,125
,75,35,0.5,2.5,E,300,125,75,35,0.5,2.
5,E,200,25,75,35,0.6,2.5,E,300,25,75,
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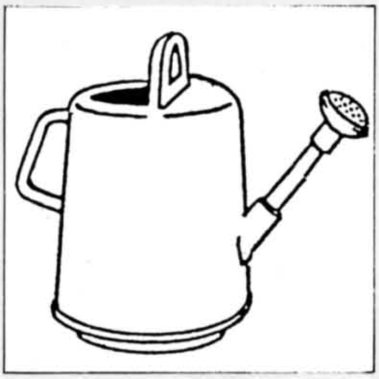

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20650  DATA telephone,E,250,85,25,25,
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,400,100,D,375,150,D,125,150,D,100,10
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20660  DATA dishcloth,M,200,50,D,300,
50,D,300,150,D,200,150,D,200,50,*
20670  DATA washing up bowl,M,150,100
,D,175,50,D,325,50,D,350,100,D,150,10
0,*
20680  DATA tea towel,M,125,50,D,375,
50,D,375,150,D,125,150,D,125,50,*
20690  DATA washing up liquid,M,200,1
0,D,300,10,D,300,160,D,275,175,D,275,
190,D,225,190,D,225,175,D,200,160,D,2
00,10,*
20700  DATA bed,M,150,50,D,150,120,M,
150,100,D,350,100,D,350,75,D,150,75,M
,350,50,D,350,140,*
20710  DATA nightshirt,M,200,10,D,300
,10,D,300,115,D,325,80,D,350,100,D,30
0,150,D,270,160,D,250,140,D,230,160,D
,200,150,D,150,100,D,170,80,D,200,115
,D,200,10,*
20720  DATA pillow,E,250,100,150,50,1
.1,2.2,E,250,100,150,50,4.2,5.3,M,175
,60,D,175,140,M,325,60,D,325,140,*
29999  DATA *
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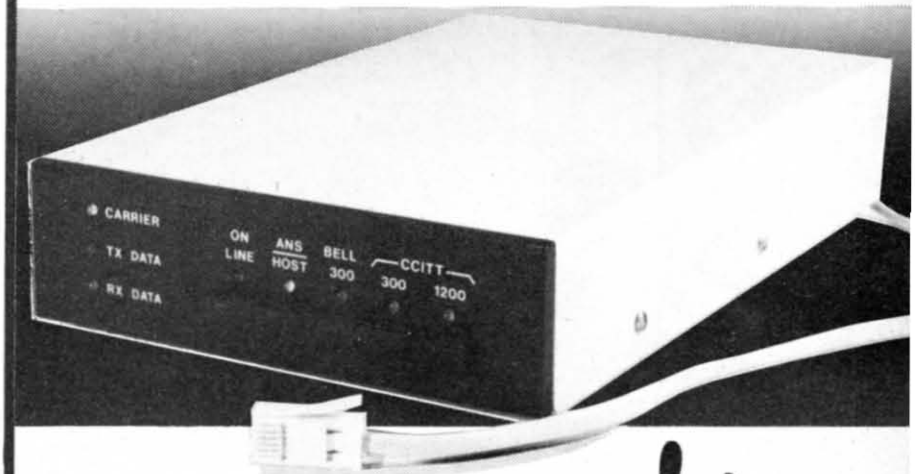

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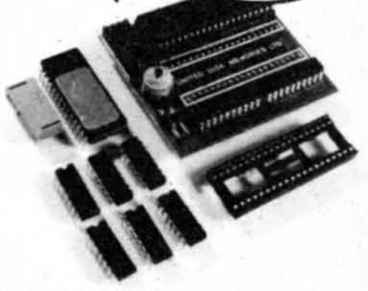

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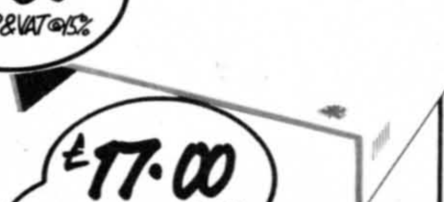

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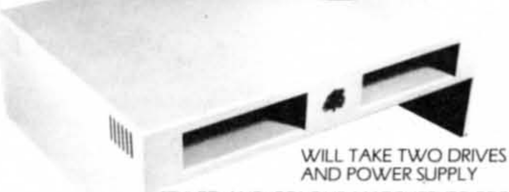

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SEE HOW YOUR MICRO SHAPES UP TO BEING TAUGHT

JOHN TISSANDIER presents a program to demonstrate artificial intelligence – and to provide lots of family fun

THIS program should appeal both to the reader who likes to dabble in Artificial Intelligence and also to the younger members of the family who like conversing with computers.

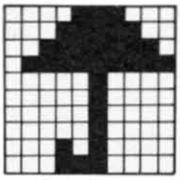
The idea is to teach the program to recognise different objects by drawing simple examples using the cursor keys. No matter how little it knows, the bold, but foolish program will always have a go at naming the object you show it and may come out with some weird suggestions.

Eventually it will surprise your friends when you invite them to draw an object on the screen and (with a bit of luck) it is able to identify it.

I have found that children enjoy teaching the program new objects and testing to see if it can recognise their drawings.

The program has two menus, both toggled using the Escape key.

Menu 1 controls all the commands involved with drawing. The cursor keys move the cursor around a 10 by 10 grid in the centre of the screen. In default mode this will draw lines.



Umbrella

To move to another part of the screen without drawing press S (Skip) and to erase press E.

To return to normal drawing press D. Pressing W will wipe the grid clear. When the drawing is complete press Return and the program will begin to analyse it.

The second menu is concerned with saving and loading files and more drastic things like re-initialising the program and quitting. Pressing V (View) will list the names of the objects entered so far.

When the program has been taught objects this knowledge can be saved as a file containing the names of the objects supplied by the user and a code number for each one.

How is it possible to store enough information in just *one* number to differentiate between say a ladder, a cross, a giraffe and a fork? The answer lies in the use of bitwise logic.

The code for each object is stored in an integer number. The BBC Micro stores the actual value of an integer in 4 bytes. This gives 4 x 8 = 32 bits. Each could be set equal to 0 or 1. That is, if you could access each bit separately, in *one* integer could be recorded 32 true or false statements.

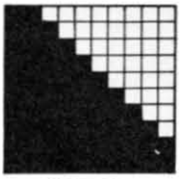
To see how this is done study the listing. In fact, the program only makes use of the first 28 bits and hence is capable of expansion and being made more accurate. (Note that in practice only 31 bits are accessible.)

The actual information stored in these 28 bits are organised as follows:

Bits 0-3 are used to store the number of vertical lines that make up the object.

Bits 4-7 hold the number of horizontal lines. Four bits are needed in each case because the maximum possible number of lines is 10.

Bits 8-12 record five true or false statements concerning relationships that exist between the vertical lines making up the object.

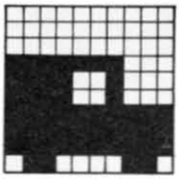


Stairway

This works by first comparing the length of the line on the extreme left with that of the line on the extreme right. If is is the same then bit 8 is made equal to 1, else it is made equal to 0.

Similarly, moving towards the middle of the object the next two lines are compared. This continues until the entire object has been scanned. Empty grid columns are ignored. Figure I shows this for a chair. Next the horizontal lines are also scanned in pairs starting with the top and bottom and their lengths compared. The results are stored in bits 13-17.

Finally the vertical lines are compared with the horizontal lines and the results stored in bits 18-27. The vertical line on the extreme left is compared with the horizontal line at the bottom of the object. If their lengths are equal then 1, else 0, is stored in bit 18 of the code.



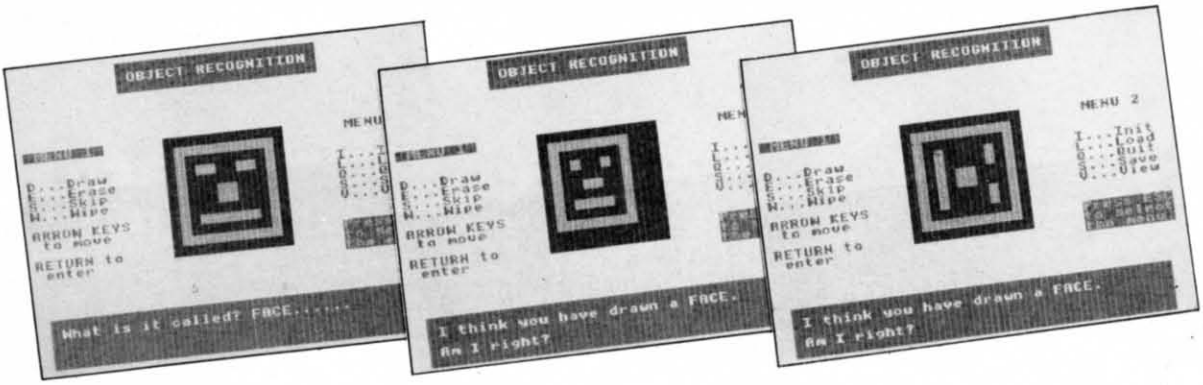
Van

Then the next vertical line moving right is compared with the next horizontal line moving up, and so on. A potential maximum of 10 bits are needed for these comparisions.

The procedure described above is perhaps a rather arbitrary solution to what is in fact a very complex problem. However it has the advantage of relative simplicity and compactness, because the same loop structure can be used for the horizontal, vertical and horizontal-vertical analyses.

Also its power lies in the fact that if the object, say the chair in the example above, is reflected to face in the opposite direction (see Figure II) then the vertical code will still be 00010.

It is, of course, to achieve this result



What is it called? FACE......

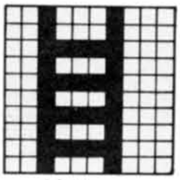
I think you have drawn a FACE.
Am I right?

I think you have drawn a FACE.
Am I right?

that when scanning the object "a" is compared with "d" and not with "b" and so on, otherwise a different code would result from the reflection.

Similarly, because the method ignores the empty columns and rows of the grid and only looks at the object, moving the latter anywhere on the grid (know as translation in mathematics – see Figure III) will still produce the same code.

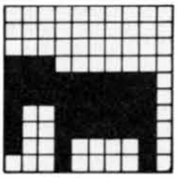
Hence it is a far more powerful method of recognition than an apparently more exact one which would check the grid for one to one equivalence between each cell and data held in memory. Such a method would only recognise an object if it was drawn in exactly the same way and in the same position on the grid.



Ladder

Object recognition does not depend on the position of the object in the grid, and therefore will cope happily with translations and reflections about a vertical axis.

Different sized versions of an object are more of a problem, because in this case different codes will be produced. If the program is taught a large example of object A and a small example of object B, then when asked to recognise a small version of A it may find its code is closer to that of B rather than that of A, merely because their similarity in size will predominate over their difference in shape.



Elephant

The solution to this is to provide the program with both large and small – and possibly medium sized – versions of every object it is taught. This is discussed further in the section on learning strategies.

Here are some examples of the codes produced by different shapes. Filling the window completely with colour gives this code:

bit 27 1111111111-11111-11111-1010-1010 bit 0

(Note: 1010=8+2=10). This shows that there are 10 vertical lines, 10 horizontal lines and complete internal symmetry. Here are the codes for one vertical line 10 units long, one horizontal line 10 units long, and a blank screen respectively:

0000000000-11111-00000-0000-0001
0000000000-00000-11111-0001-0000
0000000000-00000-00000-0000-0000

These codes are shown for interest only. They are calculated by the program and transparent to the user. Note that a code does not contain the information necessary to reconstitute the object. This is stored temporarily in the array *grid%(20)* and updated when a new object is entered.

How well the program performs is variable and depends on the mix of different objects held in memory. Sometimes it appears very clever at being able to cope with different examples of an object drawn in different areas of the screen, at different orientations and in different sizes.

At other times it appears to make very elementary mistakes. In particular it is confused by size. In any case it is expecting a lot to hope a computer can recognise an object when given only one example of it.

One can employ several strategies to deal with this problem. One way would have been to enter many examples of an object in different sizes and orientations.

The program would have worked out the codes and averaged out the results, storing those characteristics that seem essential to the nature of the object and disregarding the rest. So one would have ended up with a set of statements that were likely to be true for that particular object.

I disregarded this option because I wanted the program to be suitable for children. They would have been bored by

→

"a" compared with "d". Unequal therefore store 0 in bit 8. "b" compared with "c". Equal therefore store 1 in bit 9.

Empty columns are ignored so remaining 3 bits are not used and made equal to 0. Code for vertical lines = 00010.

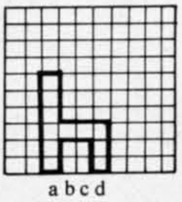


Figure I

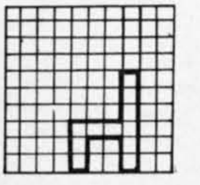


Figure II

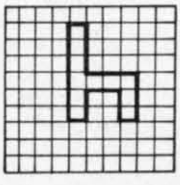
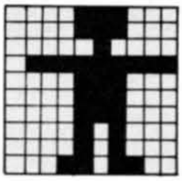


Figure III



Man

From Page 135

necessarily having to draw each new object many times.

Instead the strategy employed is to teach the program only what it actually needs to know. If it can cope with only one example of an object, so much the better. If it makes a mistake it will say: "I can't make out this object. Do you want me to learn it?"

So one can teach it that this is a further example of an object it should already know. This is why the list produced by the View option will in general contain the same names repeated at various points.

Turn to Page 159

BECAUSE of memory constraints this has to be a two part program.

Type in Program I and SAVE it with any filename you choose, then type in Program II but SAVE this with the filename "OR2". CHAINing the first program will then run the complete utility.

If you want to choose your own filename for Program II, you must alter line 100 in Program I to:

100 CHAIN "your_filename"

where "your_filename" is totally different from one chosen for Program I, and, if you are using discs, must contain no more than seven characters.

PROCEDURES

init	Dimension arrays, and so on.
adjust	Adjusts data if Escape pressed in the middle of a procedure or new object rejected.
title	Highlights Menu 1 or Menu 2.
menu1	Calls procedures related to drawing object and recognising it.
menu2	Selects options relating to files and so on.
initdraw	Sets cursor position and colour.
draw	Draws object.
grid	Maps position of object on a 10 by 10 array using POINT command.
findrel	Checks the internal relationships in the object's shape.
lines	Called by PROCfindrel to analyse the horizontal and vertical lines making up the object.
match	Checks current object against all known objects for best fit.
nameobj	Names the object it thinks it has recognised.
new	New object named by user.
load	Loads file.
save	Saves file.
view	Produces list of known objects.
window	Switches between screen windows and redefines cursor.
message	Issues appropriate messages and warnings.

The blank lines before and after each DEFPROC are inserted deliberately to aid program readability.

FUNCTIONS

FNname	Checks length of object name and file names.
FNcheck	Validates user responses.

VARIABLES

fs	Filing system.
M%	Maximum number of objects.
menu	Menu 1 or 2.
grid%(10,10)	To map the object.
line%(20)	To store information about the lines making up the object.
bit%(20)	To store the values of 2 to the power of 8 to 27.
name$(M%)	To store the names of the objects.
rel%(M%)	To store the code for each object.
n%	Number of objects entered.
f	Foreground colour.
b	Background colour.
j%,k%	Loop counters.
o%	Menu option.
x%,y%	Position of cursor.
d	Flag – if true print block on grid.
r%	If 1 check vertical lines, if 2 horizontal lines, if 3 vertical and horizontal lines.
p%	Exponential power.
f%,l%	First and last lines to be examined in array *line%(20)*.
mf%	Maximum possible value of *f%*.
ml%	Minimum possible value of *l%*.
e%	Counter for elements or blocks of the grid occupied by the object.
s%	Score obtained when trying to match latest object with all known ones.
b%	Best score.
m%	Number of object that gives the best match.
v%	Value of bit in code for known object being compared with *vl%*.
vl%	Value of bit in code for last object drawn.
ans	User response to questions.
t$	Text input by user.
t%	Tab position.
ml%	Maximum length of text.
n$	Name of object or file.
c	Channel.
w%	Window.
z%	Number of message to be printed.
d%	Duration of message on screen.

LOADER PROGRAM

150	Sets up VDU7 to use Envelope 1.
160	Sets the pitch of VDU7.
170	Sets the duration of VDU7.
470	Determines whether tape or disc being used.
480	If tape PAGE set to &E00 and maximum number of objects to 120, else PAGE set to &1300 and M%=80.

MAIN PROGRAM

50	Using the EOR command allows Escape to toggle between Menu 1 and Menu 2.
170	Rather than calculating each time the bit values are stored in an array.
520	ANDing with &DF allows for both lower and upper case.
2050	VDU23 code used to alter the cursor start and end registers (R10,R11) in the 6845 CRTC, to produce the cursor in the middle of a block.

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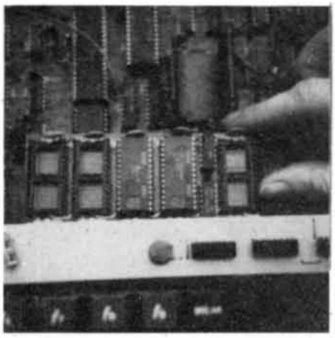

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Catnap listing

From Page 140

```
     an extra man afterthe third
     sheet."
400 *FX15,1
410 I=INKEY (2000)
420 PRINT ''"Use the following keys:
    "
430 PRINT ''"   Z - LEFT"'"   X
     - RIGHT"'"   * - UP"'"   ?
     - DOWN"'"   Q - SOUND OFF
       P - PAUSE"'"   S - SOUND
     ON    R - RESTART"
440 PRINT '
450 VDU 28,13,28,28,27
460 COLOUR 131
    :COLOUR 2
470 ON ERROR GOTO 520
480 PROCINIT
490 *FX15,1
500 PRINT "PRESS ANY KEY"
    :G=GET
510 REPEAT
520 PROCRESET
530 MODE 2
540 REPEAT
550 PROCSCREEN
560 PROCGAME
570 PROCFIN
580 IF (SCREEN=3 OR SCREEN=7)
    AND DEAD%=0 LIV%=LIV%+1
    :SOUND 2,1,140,8
590 IF DEAD%=1LIV%=LIV%-1
    :DEAD%=0
    ELSE SCREEN=SCREEN+1
600 IF SCREEN=9 SCREEN=1
    :S%=S%+1000
    :SOUND &101,3,81,10
    :SOUND &102,4,109,10
    :SOUND &101,3,101,10
    :SOUND &102,4,129,10
    :SOUND &101,3,129,10
    :SOUND &102,4,157,10
610 UNTIL LIV%=0
620 MODE 7
630 PROCHISCORE
640 UNTIL 0
650 DEF PROCINIT
660 DIM S(5),N$(10)
670 FOR N=1TO 5
680 S(N)=1500-250*N
690 READ N$(N)
700 NEXT
710 DATA CAT-NAPPER ,GRAHAM ,JEDI
     KNIGHT ,BOY GEORGE ,(c) G.LENG
     (1984)
720 R$=CHR$ 224+" "
730 ENDPROC
740 DEF PROCRESET
750 RESTORE 1900
760 LIV%=3
    :S%=0
    :SCREEN=1
770 ENDPROC
780 DEF PROCSCREEN
790 IF SCREEN=1 VDU 19,4,2,0,0
    ,0,19,9,1,0,0,0,19,8,3,0,0
    ,0,19,15,6,0,0,0
800 IF SCREEN=2 VDU 19,4,4,0,0
    ,0,19,15,2,0,0,0,19,9,1,0,0
    ,0
810 IF SCREEN=3 VDU 19,4,5,0,0
    ,0,19,15,1,0,0,0,19,9,2,0,0
    ,0
820 IF SCREEN=4 VDU 19,4,1,0,0
    ,0,19,15,4,0,0,0,19,9,5,0,0
    ,0
830 IF SCREEN=5 VDU 19,4,3,0,0
    ,0,19,15,1,0,0,0,19,9,7,0,0
    ,0
840 IF SCREEN=6 VDU 19,4,1,0,0
    ,0,19,15,3,0,0,0,19,9,4,0,0
    ,0
850 IF SCREEN=7 VDU 19,4,7,0,0
    ,0,19,15,5,0,0,0,19,9,3,0,0
    ,0
860 IF SCREEN=8 VDU 19,4,4,0,0
    ,0,19,15,7,0,0,0,19,9,6,0,0
    ,0
870 M%=227
    :X%=15
    :Y%=0
    :O%=32
    :o%=0
880 C%=229
    :CX%=0
    :CY%=22
    :CO%=32
    :co%=6
    :DIR%=1
890 UD%=1
    :B%=0
900 DEAD%=0
910 M=0
920 CLS
930 COLOUR 132
    :CLS
    :COLOUR 128
940 PRINT TAB(11,0)"          "
950 COLOUR 4
960 PRINT TAB(0,6)SPC (20)
970 PRINT TAB(0,12)SPC (20)
980 PRINT TAB(0,17)SPC (20)
990 PRINT TAB(0,22)SPC (20)
1000 PRINT TAB(0,27)SPC (20)
1010 PROCLAYOUT
1020 FOR N=0TO 30
     :PRINT TAB(10,N)" ";
     :NEXT
1030 COLOUR 3
1040 PRINT TAB(15,0);STRING$(LIV%
     ,CHR$ 227);
1050 COLOUR 0
     :COLOUR 132
     :PRINT TAB(12,30);"SC ";S%;
     TAB(0,30)"SCREEN ";SCREEN
     :COLOUR 128
1060 COLOUR 5
     :PRINT TAB(0,0)"TIME";
1070 ENDPROC
1080 DEF PROCPT
1090 POU%=POINT(X%*64+32,(31-Y%)*32+4
     8)
1100 POD%=POINT(X%*64+38,(31-Y%)*32-2
     4)
1110 POL%=POINT(X%*64-32,(31-Y%)*32+8)
1120 POR%=POINT(X%*64+96,(31-Y%)*32+8)
1130 ENDPROC
1140 DEF PROCGAME
1150 TIME =1
1160 VDU 23;8202;0;0;0;
1170 REPEAT
1180 T%=999-TIME /5
1190 IF T%<0 T%=0
     :PRINT TAB(5,0);"0 ";
     :PROCDEAD
1200 PRINT TAB(5,0);T%;" "
1210 PROCMVE
1220 PROCCAT
1230 PROCBCT
1240 UNTIL DEAD%=1 OR M=7
1250 ENDPROC
1260 DEF PROCRT
1270 IF POR%=4 ENDPROC
1280 IF POR%=0 O%=32
1290 IF POR%=8 O%=236
     :o%=8
1300 IF POR%=6 O%=226
     :o%=6
1310 X%=X%+1
1320 ENDPROC
1330 DEF PROCLT
1340 IF POL%=4 OR POL%=9 ENDPROC
1350 IF POL%=0 O%=32
1360 IF POL%=8 O%=236
     :o%=8
1370 IF POL%=6 O%=226
     :o%=6
1380 X%=X%-1
1390 ENDPROC
1400 DEF PROCDN
1410 IF POD%=8 O%=236
     :o%=8
     :Y%=Y%+1
1420 ENDPROC
1430 DEF PROCFALL
```

→

CATNAP

Catch the mice and rescue Fido the cat down GRAHAM LENG's well!

I KNOW they say cats have nine lives. But in this action-packed game Fido, an exceedingly oddly named cat, takes it a little too far!

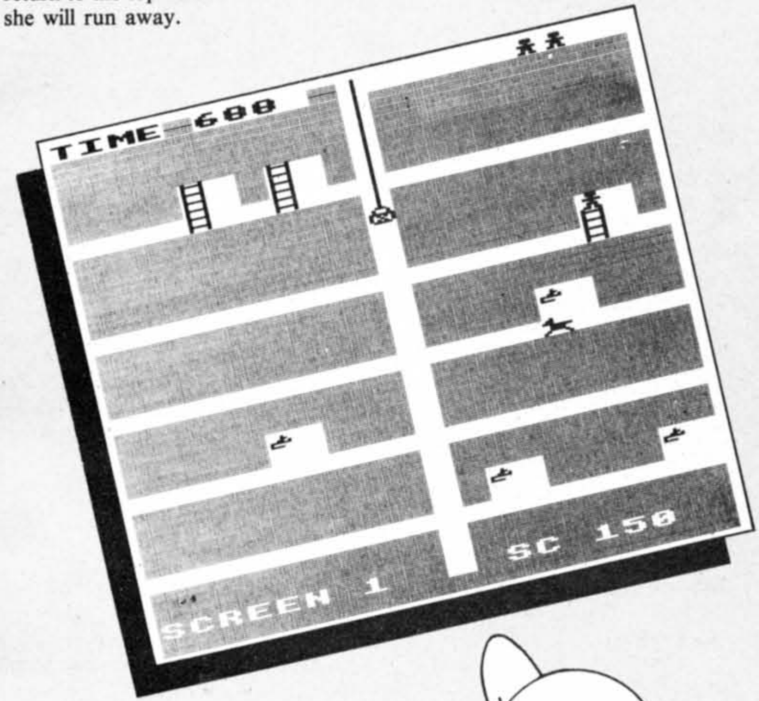
Poor Fido has fallen down a well. She is, however, a little reluctant to come out owing to the abundance of mice down there.

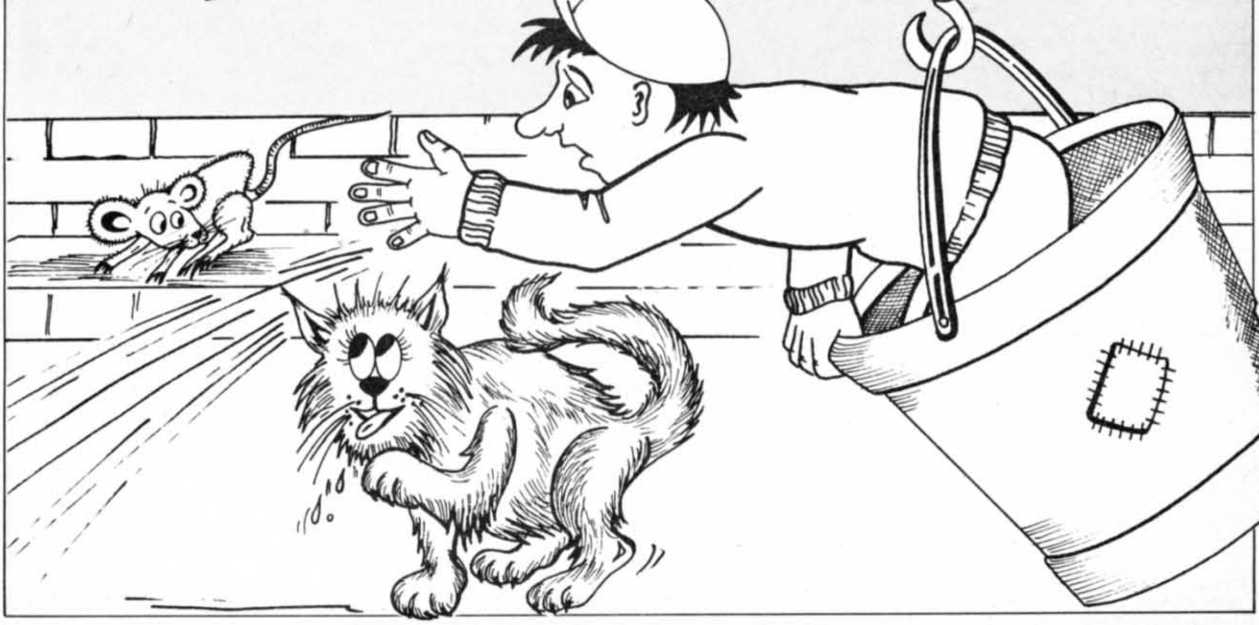
You can only rescue her by going down on the bucket and collecting all the mice. You must then be careful to return to the top before she does or else she will run away.

Fido can climb the rope as well as jump over gaps (both these things you are unable to do yourself). But being a vaguely superstitious cat she will not go under ladders.

Can you tempt Fido out of the well? You must remember not to bump into her on your travels.

And be careful, too, not to fall down the well or run out of time.





Catnap listing

From Page 139

```
 10 REM *** Cat-napper ***
 20 REM *** Micro User 1984 ***
 30 VDU 23,224,0,0,8,12,26,&7E
    ,&40,&78
 40 VDU 23,225,0,0,0,0,0,0,&7E
    ,&FF
 50 VDU 23,226,8,8,8,8,8,8,8,8
 60 VDU 23,227,&1C,&1C,8,&3E,8
    ,&1C,&14,&36
 70 VDU 23,228,&1C,&1C,8,&1C,8
    ,8,8,&1C
 80 VDU 23,229,4,&86,&46,&3C,&3C
    ,&3C,&24,&24
 90 VDU 23,230,4,6,7,&FC,&3C,&3C
    ,&42,&81
100 VDU 23,231,&14,&1C,&1C,8,&BE
    ,&BE,&9C,&FC
110 VDU 23,232,255,255,255,255
    ,255,255,255,255
120 VDU 23,233,&20,&61,&E2,&3C
    ,&3C,&3C,&24,&24
130 VDU 23,234,&20,&60,&E0,&3F
    ,&3C,&3C,&42,&81
140 VDU 23,235,&1C,&22,&22,&7F
    ,&55,&49,&55,&3E
150 VDU 23,236,66,126,66,66,66
    ,126,66,66
160 ENVELOPE 1,2,0,0,0,0,0,0,64
    ,-7,0,0,126,0
170 ENVELOPE 2,129,20,-1,-1,5,10
    ,10,20,-2,-4,-4,126,0
180 ENVELOPE 3,4,16,12,20,1,1,1
    ,63,-2,-2,-10,126,0
190 ENVELOPE 4,4,-12,-16,-20,1
    ,1,1,63,-2,-2,-10,126,0
200 MODE 1
210 VDU 19,3,4,0,0,0
220 COLOUR 131
    :COLOUR 2
    :CLS
230 PRINT '"          ";CHR$ 231;
    CHR$ 231;CHR$ 231;"   CAT-NAPPER
       ";CHR$ 231;CHR$ 231;CHR$ 231;
240 C$=CHR$ 231+" "
250 PRINT TAB(5,30)STRING$(16,C$)
260 VDU 28,5,25,35,5
270 COLOUR 129
    :CLS
    :COLOUR 0
280 PRINT TAB(0,20);
290 PRINT "  ***   CAT-NAPPER
      ***"''"Poor fido your pet
     cat has     fallen down the
     well."
300 PRINT "You can rescue her by
     going    down on the bucket,
     collecting all the mice and
     then getting  back to the top
     before she does"
310 PRINT '"Remember fido can climb
     the    rope and jump over gaps
     which  you can't - but  (being
     a sort of superstitious cat)
     she will not go under ladders."
320 FOR N=1TO 8
330 READ P,D
340 SOUND 1,1,P,D
350 NEXT
360 DATA 101,8,81,8,101,16,117
    ,4,121,4,109,4,117,4,101,16
370 *FX15,1
380 I=INKEY (2000)
390 PRINT ''"Be careful to dodge
     the cat    and try not to fall
     down the   well or run out
     of time.       You will get
```

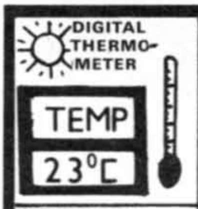
PROCEDURES

PROCINIT	Sets up high score table
PROCSCREEN, PROCLAYOUT	Sets up screen
PROCGAME	Main loop
PROCMOVE, PROCCAT, PROCBCT	Moves man, cat, bucket
PROCRT, PROCLT, PROCDN, PROCFALL, PROCUP	Moves man
PROCLADDER	Draws ladder and checks for mice
PROCDEAD	Death routine
PROCCHG	Changes direction of cat
PROCFIN, PROCCATUP, PROCRIDE	Controls race for home when all mice caught
PROCHISCORE	Hall of fame

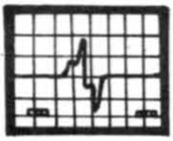
VARIABLES

SCREEN	Screen in play
DEAD%	1 if dead, 0 if alive
LIV%	Number of lives left
S%	Score
M%, C%	User defined characters in use for man and cat
X%, Y% and CX%, CY%	Coordinates of man and cat
O%, o% and CO%, co%	Stores character and colour moved over
DIR%	Direction of cat
B%	Y coordinate of bucket
UD%	Bucket up (0) or down (1)
M	Number of mice taken
POU%, POD%, POL%, POR%	"Point" values around man
POC%	"Point" value in front of cat
T%	Time
S(10)	Array of high scores
N$(10)	Array of names
NAME$	Your name
ENTRY	Your position in high score table

DIGITAL THERMOMETER



HEART RATE MONITOR



LIE DETECTOR

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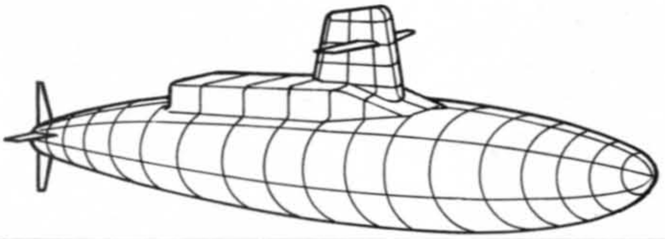

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Catnap listing

From Page 142

```
1440 IF POD%=8 ENDPROC
1450 IF POD%=0 X%=XX%
     :Y%=Y%+1
     :O%=32
1460 IF X%<>XX% ENDPROC
1470 IF POD%=6 Y%=Y%+1
     :O%=226
     :o%=6
1480 ENDPROC
1490 DEF PROCUP
1500 IF Y%=B%-1 Y%=B%-2
1510 Y%=Y%-1
1520 ENDPROC
1530 DEF PROCMVE
1540 PROCPT
1550 XX%=X%
     :YY%=Y%
1560 OO%=O%
     :oo%=o%
1570 IF INKEY (-56) T=TIME
     :REPEAT UNTIL INKEY (-52)
     :TIME =T
1580 IF INKEY (-67) PROCRT
     :
     ELSE IF INKEY (-98) PROCLT
     :
     ELSE IF INKEY (-73) AND X%<>10
      PROCLADDER
     :
     ELSE IF INKEY (-105) PROCDN
1590 IF INKEY (-17)
     THEN *FX210,1
1600 IF INKEY (-82)
     THEN *FX210,0
1610 IF X%=10 AND (Y%=B%-1 OR Y%=B%-2
     ) AND UD%=0 PROCUP
     :
     ELSE PROCFALL
1620 IF X%>19 X%=19
     ELSE IF X%<0 X%=0
1630 IF Y%<0 Y%=0
1640 IF X%<>XX% SOUND 0,-10,6,1
1650 COLOUR oo%
     :PRINT TAB(XX%,YY%)CHR$ OO%;
     :COLOUR 3
     :PRINT TAB(X%,Y%)CHR$ M%;
1660 IF X%=XX% GOTO 1680
1670 IF M%=227 M%=228
     :
     ELSE M%=227
1680 IF Y%=30 PROCDEAD
1690 ENDPROC
1700 DEF PROCCHG
1710 DIR%=DIR%+1
     :IF DIR%=2 DIR%=0
1720 C%=C%+4
     :IF C%>234 C%=229
1730 IF POC%=8 CO%=236
     :co%=8
1740 IF POC%=4 CO%=232
     :co%=4
1750 ENDPROC
1760 DEF PROCCAT
1770 IF CY%<B% AND CX%=10 CO%=226
     :co%=6
1780 COLOUR co%
     :PRINT TAB(CX%,CY%)CHR$ CO%
1790 CO%=32
1800 CXX%=CX%
1810 IF DIR%=1 CX%=CX%+1
     ELSE CX%=CX%-1
1820 POC%=POINT(CX%*64+32,(32-CY%)*32
     -24)
1830 IF POC%=3
     :PROCDEAD
1840 IF POC%=8 OR POC%=4 PROCCHG
1850 IF CX%>19 DIR%=0
     :C%=233
     :CX%=19
     :PRINT TAB(CX%,CY%)" ";
     :READ CY%
     :GOTO 1890
1860 IF CX%<0 DIR%=1
     :C%=229
     :CX%=0
     :PRINT TAB(CX%,CY%)" ";
     :READ CY%
     :GOTO 1890
1870 COLOUR 15
     :PRINT TAB(CX%,CY%);CHR$ C%
1880 C%=C%+1
     :IF C%=231 C%=229
     :
     ELSE IF C%=235 C%=233
1890 IF CY%=6 RESTORE 1900
1900 DATA 17,27,12,22,6
1910 IF SCREEN>4 AND (CX%=0 OR CX%=19
     ) AND (Y%=17 OR Y%=27 OR Y%=12
      OR Y%=22 OR Y%=6) PRINT
     TAB(CX%,CY%)" "
     :CY%=Y%
1920 ENDPROC
1930 DEF PROCBCT
1940 IF UD%=1 COLOUR 6
     :PRINT TAB(10,B%)CHR$ 226
     :
     ELSE PRINT TAB(10,B%)" ";
1950 IF UD%=1 B%=B%+1
     ELSE B%=B%-1
1960 IF B%=0 UD%=1
1970 IF B%=30 UD%=0
1980 COLOUR 5
     :PRINT TAB(10,B%)CHR$ 235
1990 ENDPROC
2000 DEF PROCLADDER
2010 IF POU%=4 OR POU%=-1 ENDPROC
2020 IF POU%=9 SOUND 2,2,100,1
     :S%=S%+50
     :M=M+1
2030 COLOUR 0
     :COLOUR 132
     :PRINT TAB(15,30);S%;
     :COLOUR 128
2040 Y%=Y%-1
     :COLOUR 3
     :PRINT TAB(X%,Y%)CHR$ M%;
     TAB(X%,Y%)" ";
2050 COLOUR 8
     :PRINT TAB(X%,Y%+1)CHR$ 236
2060 O%=236
     :o%=8
     :OO%=236
     :oo%=8
2070 ENDPROC
2080 DEF PROCDEAD
2090 DEAD%=1
2100 COLOUR 3
     :PRINT TAB(X%,Y%)CHR$ 225
2110 SOUND 0,1,5,8
2120 FOR N=1TO 3000
     :NEXT
2130 SOUND 1,1,101,10
     :SOUND 1,1,81,10
     :SOUND 1,1,101,20
2140 IF LIV%=1 T=TIME
     :REPEAT UNTIL TIME =T+200
2150 ENDPROC
2160 DEF PROCFIN
2170 IF M<>7 ENDPROC
```

→

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Catnap listing

From Page 144

```
2180 T%=T%-T%MOD 10
     :PRINT TAB(5,0);T%;" ";
2190 M=0
2200 REPEAT
2210 PROCMVE
2220 PROCCATUP
2230 PROCBCT
2240 UNTIL Y%=0 OR CY%=0 OR DEAD%=1
2250 IF CY%=0 PROCDEAD
     : ENDPROC
2260 IF DEAD%=1 ENDPROC
2270 S%=S%+T%
2280 PRINT TAB(15,30);S%;
2290 SOUND 1,-15,101,8
     :SOUND 1,-15,117,8
     :SOUND 1,-15,129,16
2300 FOR N=1TO 5000
     :NEXT
2310 ENDPROC
2320 DEF PROCCATUP
2330 IF (CX%=9 OR CX%=11)AND B%<CY%
      C%=231
     :ENDPROC
2340 IF CX%<>10 PROCCAT
     ELSE PROCRIDE
2350 ENDPROC
2360 DEF PROCRIDE
2370 COLOUR 6
     :PRINT TAB(10,CY%)CHR$ 226
2380 CY%=CY%-1
2390 COLOUR 15
     :PRINT TAB(10,CY%)CHR$ 231
2400 ENDPROC
2410 DEF PROCLAYOUT
2420 IF SCREEN MOD 4=1COLOUR 9
     :PRINT TAB(4,4)R$;TAB(7,4)R$;
     TAB(17,10)R$;TAB(15,15)R$;
     TAB(5,20)R$;TAB(18,25)R$;
     TAB(12,25)R$
2430 IF SCREEN MOD 4=1 PRINT
     TAB(4,5)"  ";TAB(7,5)"  ";
     TAB(17,11)"  ";TAB(15,16)"
      ";TAB(5,21)"  ";TAB(18,26)
     "  ";TAB(12,26)"  ";
2440 IF SCREEN MOD 4=2 COLOUR 9
     :PRINT TAB(14,4)R$;TAB(17,4)R$;
     TAB(7,10)R$;TAB(2,15)R$;
     TAB(15,20)CHR$ 224;TAB(5,25)R$;
     TAB(13,25)R$;
2450 IF SCREEN MOD 4=2 PRINT
     TAB(14,5)"  ";TAB(17,5)"  ";
     TAB(7,11)"  ";TAB(7,13)" ";
     TAB(7,14)" ";TAB(7,15)" ";
     TAB(7,16)" ";TAB(2,16)"  ";
     TAB(15,18)" ";TAB(15,19)" ";
     TAB(15,21)" ";TAB(5,26)"  ";
     TAB(13,26)"  ";
2460 IF SCREEN MOD 4=2 COLOUR 132
     :PRINT TAB(9,17)" ";TAB(11
     ,17)" ";
     :COLOUR 128
2470 IF SCREEN MOD 4=3 COLOUR 9
     :PRINT TAB(2,4)R$;TAB(7,10)R$;
     TAB(12,10)R$;TAB(5,15)R$;
     TAB(13,20)R$;TAB(7,25)R$;
2480 IF SCREEN MOD 4=3 PRINT
     TAB(2,5)"  ";TAB(7,11)"  ";
     TAB(12,11)"  ";TAB(5,16)"  ";
     TAB(7,26)"  ";TAB(13,21)"  ";
     TAB(12,23)" ";TAB(12,24)" ";
     TAB(12,25)" ";TAB(12,26)" ";
2490 IF SCREEN MOD 4=3 FOR N=7
     TO 26
     :PRINT TAB(2,N)" ";
     :NEXT
2500 IF SCREEN MOD 4=3 FOR N=13
     TO 26
     :PRINT TAB(18,N)" ";
     :NEXT
     :PRINT TAB(18,14)CHR$ 224;
2510 IF SCREEN MOD 4=3 COLOUR 132
     :FOR N=12TO 27STEP 5
     :PRINT TAB(9,N)" ";TAB(11,N)
     " ";
     :NEXT
     :COLOUR 128
     :PRINT TAB(11,22)" ";
2520 IF SCREEN MOD 4=0 COLOUR 9
     :PRINT TAB(14,4)R$;TAB(18,4)
     CHR$ 224;TAB(8,15)CHR$ 224;
     TAB(14,15)R$;TAB(4,25)CHR$ 224;
     TAB(8,25)R$;TAB(6,8)CHR$ 224;
2530 IF SCREEN MOD 4=0 PRINT
     TAB(14,5)"  ";TAB(18,5)" ";
     TAB(8,16)" ";TAB(14,16)"  ";
     TAB(3,26)"  ";TAB(8,26)"  ";
2540 IF SCREEN MOD 4=0 COLOUR 132
     :PRINT TAB(6,7)" ";TAB(9,17)
     " ";TAB(11,17)" ";TAB(9,22)
     " ";TAB(11,22)" ";TAB(6,27)
     " ";
     :COLOUR 128
2550 IF SCREEN MOD 4=0 PRINT
     TAB(5,17)" ";
     :FOR N=7TO 21
     :PRINT TAB(12,N)" ";TAB(17
     ,N)" ";
     :NEXT
2560 IF SCREEN MOD 4=0 FOR N=9
     TO 12
     :PRINT TAB(6,N)" ";
     :NEXT
     :FOR N=13TO 16
     :PRINT TAB(4,N)" ";
     :NEXT
     :FOR N=23TO 26
     :PRINT TAB(2,N)" ";TAB(6,N)
     " ";
     :NEXT
     :FOR N=18TO 21
     :PRINT TAB(7,N)" ";
     :NEXT
2570 ENDPROC
2580 DEF PROCHISCORE
2590 *FX15,0
2600 IF S%<S(5)PRINT ''CHR$ 136;
     CHR$ 134;"     GAME  OVER."
     :PRINT 'CHR$ 129;"You scored";
     CHR$ 131;S%
     :PRINT CHR$ 129;"Another";
     CHR$ 131;S(5)-S%;CHR$ 129;"would
      have"
     :PRINT CHR$ 129;"earned you
      a place in the hall of fame!"
     :G=GET
     :GOTO 2650
2610 PRINT CHR$ 129;"CONGRATULATIONS!
     ! Your score of ";CHR$ 131;S%
     :PRINT CHR$ 129;"Qualifies you
      for the hall of fame!"
2620 SOUND &101,3,101,10
     :SOUND &102,4,129,10
2630 INPUT '"ENTER YOUR NAME : "
      NAME$
2640 IF LEN (NAME$)>11 CLS
     :GOTO 2610
2650 CLS
2660 PRINT CHR$ 141;CHR$ 131;
     CHR$ 157;CHR$ 129;"       HIGH
        SCORE   TABLE"
2670 PRINT CHR$ 141;CHR$ 131;
     CHR$ 157;CHR$ 129;"       HIGH
        SCORE   TABLE"
2680 ENTRY=0
2690 FOR N=1TO 5
2700 IF ENTRY=0 AND S%>S(N) ENTRY=N
2710 NEXT
2720 IF ENTRY=0 GOTO 2770
2730 FOR N=5 TO ENTRY+1 STEP -1
2740 S(N)=S(N-1)
     :N$(N)=N$(N-1)
2750 NEXT
2760 S(ENTRY)=S%
     :N$(ENTRY)=NAME$
2770 FOR N=1TO 5
2780 PRINT TAB(0,N*3+3)CHR$ 129;
     TAB(2,N*3+3);S(N);TAB(7,N*3+3)
     CHR$ 131;TAB(8,N*3+3)N$(N)
2790 NEXT
2800 G=GET
2810 ENDPROC
```

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From Page 110

```
TH"
  170 REPEAT UNTIL INKEY(100)
  180 DEF PROCmenu
  190 CLS
  200 PRINTCHR$(141)CHR$(147);"TYPE S
ETTING FOR THE EPSON PRINTERS"
  210 PRINTCHR$(141)CHR$(147);"TYPE S
ETTING FOR THE EPSON PRINTERS"
  220 PRINT
  230 PRINTCHR$(146);"THE DIFFERENT T
YPE SETTINGS INCLUDE"
  240 PRINT
  250 PRINT" 1)"CHR$(145);"PICA"
  260 PRINT" 2)"CHR$(145);"ELITE"
  270 PRINT" 3)"CHR$(145);"ENLARGED"
  280 PRINT" 4)"CHR$(145);"CONDENSED"
  290 PRINT" 5)"CHR$(145);"EMPHASIZED
"
  300 PRINT" 6)"CHR$(145);"DOUBLE STR
IKE"
  310 PRINT" 7)"CHR$(145);"ALTERNATE"
  320 PRINT
  330 PRINTCHR$(149);"PRESS"CHR$(150)
;"H"CHR$(149);"FOR HELP"
  340 PRINT
  350 PRINT" Type in setting you requ
ire  ":T$=GET$
  360 IFT$="1":CLS:PROCpica
  370 IFT$="2":CLS:PROCelite
  380 IFT$="3":CLS:PROCenlarged
  390 IFT$="4":CLS:PROCcondensed
  400 IFT$="5":CLS:PROCemphasized
  410 IFT$="6":CLS:PROCdoublestrike
  420 IFT$="7":CLS:PROCalternate
  430 IFT$="H":CLS:PROChelp
  440 GOTO 190
  450 DEF PROCpica
  460 CLS
  470 PRINTCHR$(141)CHR$(147);"PICA S
ETTING"
  480 PRINTCHR$(141)CHR$(147);"PICA S
ETTING"
  490 PRINT
  500 PRINT"1)"CHR$(149);"PICA"
  510 PRINT"2)"CHR$(149);"ELITE"
  520 PRINT"3)"CHR$(149);"ENLARGED"
  530 PRINT"4)"CHR$(149);"CONDENSED"
  540 PRINT"5)"CHR$(149);"EMPHASIZED"
  550 PRINT"6)"CHR$(149);"DOUBLE STRI
KE"
  560 PRINT"7)"CHR$(149);"ALTERNATE"
  570 PRINT
  580 PRINTCHR$(150);"TYPE"CHR$(145);
"H"CHR$(150);"FOR HELP"
  590 PRINTCHR$(150);"TYPE"CHR$(145);
"M"CHR$(150);"FOR MAIN MENU"
  600 PRINT
  610 PRINT" WHICH NUMBER?":N$=GET$
  620 IFN$="1"PRINTCHR$(146);"NO ADJU
STMENT NEEDED COMMENCE PRINTING":PROC
esc:END
  630 IFN$="2"PRINTCHR$(146);"NOW IN
ELITE TYPE":VDU2:PROCe:VDU3:PROCesc:E
ND
  640 IFN$="3"PRINTCHR$(146);"NOW IN
ENLARGED TYPE":VDU2:PROCen:VDU3:PROCe
sc:END
  650 IFN$="4"PRINTCHR$(146);"NOW IN
CONDENSED TYPE":VDU2:PROCc:VDU3:PROCe
sc:END
  660 IFN$="5"PRINTCHR$(146);"NOW IN
EMPHASIZED TYPE":VDU2:PROCem:VDU3:PRO
Cesc:END
  670 IFN$="6"PRINTCHR$(146);"NOW IN
DOUBLE STRIKE TYPE":VDU2:PROCds:VDU3:
PROCesc:END
  680 IFN$="7"PRINTCHR$(146);"NOW IN
ALTERNATE TYPE":VDU2:PROCa:VDU3:PROCe
sc:END
  690 IFN$="M" PROCmenu
  700 IFN$="H" PROChelp
  710 GOTO 460
  720 ENDPROC
  730 DEF PROCelite
  740 CLS
  750 PRINTCHR$(141)CHR$(147);"ELITE
SETTING"
  760 PRINTCHR$(141)CHR$(147);"ELITE
SETTING"
  770 PRINT
  780 PRINT"1)"CHR$(149);"ELITE"
  790 PRINT"2)"CHR$(149);"ELITE ENLAR
GED"
  800 PRINT"3)"CHR$(149);"ELITE CONDE
NSED"
  810 PRINT"4)"CHR$(149);"ELITE EMPHA
SIZED"
  820 PRINT"5)"CHR$(149);"ELITE DOUBL
E STRIKE"
  830 PRINT"6)"CHR$(149);"ELITE ALTER
NATE"
  840 PRINT
  850 PRINTCHR$(150);"TYPE"CHR$(145);
"H"CHR$(150);"FOR HELP"
  860 PRINTCHR$(150);"TYPE"CHR$(145);
"M"CHR$(150);"FOR MAIN MENU"
  870 PRINT
  880 PRINT" WHICH NUMBER?":N$=GET$
  890 IFN$="1"PRINTCHR$(146);"NOW IN
ELITE TYPE":VDU2:PROCe:VDU3:PROCesc:E
ND
  900 IFN$="2"PRINTCHR$(146);"NOW IN
ELITE ENLARGED TYPE":VDU2:PROCe:PROCe
n:VDU3:PROCesc:END
  910 IFN$="3"PRINTCHR$(146);"NOW IN
ELITE CONDENSED TYPE":VDU2:PROCe:PROC
c:VDU3:PROCesc:END
  920 IFN$="4"PRINTCHR$(146);"NOW IN
ELITE EMPHASIZED TYPE":VDU2:PROCe:PRO
Cem:VDU3:PROCesc:END
  930 IFN$="5"PRINTCHR$(146);"NOW IN
ELITE DOUBLE STRIKE TYPE":VDU2:PROCe:
PROCds:VDU3:PROCesc:END
  940 IFN$="6"PRINTCHR$(146);"NOW IN
ELITE ALTERNATE TYPE":VDU2:PROCe:PROC
a:VDU3:PROCesc:END
  950 IFN$="H" PROChelp
  960 IFN$="M" PROCmenu
  970 GOTO 740
  980 DEF PROCenlarged
  990 CLS
 1000 PRINTCHR$(141)CHR$(147);"ENLARG
ED SETTING"
 1010 PRINTCHR$(141)CHR$(147);"ENLARG
ED SETTING"
 1020 PRINT
 1030 PRINT"1)"CHR$(149);"ENLARGED"
 1040 PRINT"2)"CHR$(149);"ENLARGED CO
NDENSED"
 1050 PRINT"3)"CHR$(149);"ENLARGED EM
PHASIZED"
 1060 PRINT"4)"CHR$(149);"ENLARGED DO
UBLE STRIKE"
 1070 PRINT"5)"CHR$(149);"ENLARGED AL
TERNATE"
 1080 PRINT
 1090 PRINTCHR$(150);"TYPE"CHR$(145);
"H"CHR$(150);"FOR HELP"
 1100 PRINTCHR$(150);"TYPE"CHR$(145);
"M"CHR$(150);"FOR MAIN MENU"
 1110 PRINT
 1120 PRINT" WHICH NUMBER?":N$=GET$
 1130 IFN$="1"PRINTCHR$(146);"NOW IN
ENLARGED TYPE":VDU2:PROCen:VDU3:PROCe
sc:END
 1140 IFN$="2"PRINTCHR$(146);"NOW IN
ENLARGED CONDENSED TYPE":VDU2:PROCen:
PROCc:VDU3:PROCesc:END
 1150 IFN$="3"PRINTCHR$(146);"NOW IN
ENLARGED EMPHASIZED TYPE":VDU2:PROCen
:PROCem:VDU3:PROCesc:END
 1160 IFN$="4"PRINTCHR$(146);"NOW IN
ENLARGED DOUBLE STRIKE TYPE":VDU2:PRO
Cen:PROCds:VDU3:PROCesc:END
 1170 IFN$="5"PRINTCHR$(146);"NOW IN
ENLARGED ALTERNATE TYPE":VDU2:PROCen:
PROCa:VDU3:PROCesc:END
 1180 IFN$="H" PROChelp
 1190 IFN$="M" PROCmenu
 1200 GOTO 990
 1210 DEF PROCcondensed
 1220 CLS
 1230 PRINTCHR$(141)CHR$(147);"CONDEN
SED SETTING"
 1240 PRINTCHR$(141)CHR$(147);"CONDEN
```

```
SED SETTING"
 1250 PRINT
 1260 PRINT"1)"CHR$(149);"CONDENSED"
 1270 PRINT"2)"CHR$(149);"CONDENSED D
OUBLE STRIKE"
 1280 PRINT"3)"CHR$(149);"CONDENSED A
LTERNATE"
 1290 PRINT
 1300 PRINTCHR$(150);"TYPE"CHR$(145);
"H"CHR$(150);"FOR HELP"
 1310 PRINTCHR$(150);"TYPE"CHR$(145);
"M"CHR$(150);"FOR MAIN MENU"
 1320 PRINT
 1330 PRINT" WHICH NUMBER?":N$=GET$
 1340 IFN$="1"PRINTCHR$(146);"NOW IN
CONDENSED TYPE":VDU2:PROCc:VDU3:PROCe
sc:END
 1350 IFN$="2"PRINTCHR$(146);"NOW IN
CONDENSED DOUBLE STRIKE TYPE":VDU2:PR
OCc:PROCds:VDU3:PROCesc:END
 1360 IFN$="3"PRINTCHR4(146);"NOW IN
CONDENSED ALTERNATE TYPE":VDU2:PROCc:
PROCa:VDU3:PROCesc:END
 1370 IFN$="H" PROChelp
 1380 IFN$="M" PROCmenu
 1390 GOTO 1220
 1400 DEF PROCemphasized
 1410 CLS
 1420 PRINTCHR$(141)CHR$(147);"EMPHAS
IZED SETTING"
 1430 PRINTCHR$(141)CHR$(147);"EMPHAS
IZED SETTING"
 1440 PRINT
 1450 PRINT"1)"CHR$(149);"EMPHASIZED"
 1460 PRINT"2)"CHR$(149);"EMPHASIZED
DOUBLE STRIKE"
 1470 PRINT"3)"CHR$(149);"EMPHASIZED
ALTERNATE"
 1480 PRINT
 1490 PRINTCHR$(150);"TYPE"CHR$(145);
"H"CHR$(150);"FOR HELP"
 1500 PRINTCHR$(150);"TYPE"CHR$(145);
"M"CHR$(150);"FOR MAIN MENU"
 1510 PRINT
 1520 PRINT" WHICH NUMBER?":N$=GET$
 1530 IFN$="1"PRINTCHR$(146);"NOW IN
EMPHASIZED TYPE":VDU2:PROCem:VDU3:PRO
Cesc:END
 1540 IFN$="2"PRINTCHR$(146);"NOW IN
EMPHASIZED DOUBLE STRIKE":VDU2:PROCem
:PROCds:VDU3:PROCesc:END
 1550 IFN$="3"PRINTCHR$(146);"NOW IN
EMPHASIZED ALTERNATE TYPE":VDU2:PROCe
m:PROCa:VDU3:PROCesc:END
 1560 IFN$="H" PROChelp
 1570 IFN$="M" PROCmenu
 1580 GOTO 1410
 1590 DEF PROCdoublestrike
 1600 CLS
 1610 PRINTCHR$(141)CHR$(147);"DOUBLE
 STRIKE SETTING"
 1620 PRINTCHR$(141)CHR$(147);"DOUBLE
 STRIKE SETTING"
 1630 PRINT
 1640 PRINT"1)"CHR$(149);"DOUBLE STRI
KE"
 1650 PRINT"2)"CHR$(149);"DOUBLE STRI
KE ALTERNATE"
 1660 PRINT
 1670 PRINTCHR$(150);"TYPE"CHR$(145);
"H"CHR$(150);"FOR HELP"
 1680 PRINTCHR$(150);"TYPE"CHR$(145);
"M"CHR$(150);"FOR MAIN MENU"
 1690 PRINT
```

```
 1700 PRINT" WHICH NUMBER?":N$=GET$
 1710 IFN$="1"PRINTCHR$(146);"NOW IN
DOUBLE STRIKE TYPE":VDU2:PROCds:VDU3:
PROCesc:END
 1720 IFN$="2"PRINTCHR$(146);"NOW IN
DOUBLE STRIKE ALTERNATE TYPE":VDU2:PR
OCds:PROCa:VDU3:PROCesc:END
 1730 IFN$="H" PROChelp
 1740 IFN$="M" PROCmenu
 1750 GOTO 1600
 1760 DEF PROCalternate
 1770 CLS
 1780 PRINTCHR$(141)CHR$(147);"ALTERN
ATE SETTING"
 1790 PRINTCHR$(141)CHR$(147);"ALTERN
ATE SETTING"
 1800 PRINT
 1810 PRINT"1)"CHR$(149);"ALTERNATE"

 1820 PRINT
 1830 PRINTCHR$(150);"TYPE"CHR$(145);
"H"CHR$(150);"FOR HELP"
 1840 PRINTCHR$(150);"TYPE"CHR$(145);
"M"CHR$(150);"FOR MAIN MENU"
 1850 PRINT
 1860 PRINT" WHICH NUMBER?":N$=GET$
 1870 IFN$="1"PRINTCHR$(146);"NOW IN
ALTERNATE TYPE":VDU2:PROCa:VDU3:PROCe
sc:END
 1880 IFN$="H" PROChelp
 1890 IFN$="M" PROCmenu
 1900 GOTO 1770
 1910 DEF PROCe
 1920 VDU1,27,1,77
 1930 ENDPROC
 1940 DEF PROCen
 1950 VDU1,27,1,215,1,49
 1960 ENDPROC
 1970 DEF PROCc
 1980 VDU1,15
 1990 ENDPROC
 2000 DEF PROCem
 2010 VDU1,27,1,69
 2020 ENDPROC
 2030 DEF PROCds
 2040 VDU1,27,1,71
 2050 ENDPROC
 2060 DEF PROCa
 2070 VDU1,27,1,52
 2080 ENDPROC
 2090 DEF PROCesc
 2100 *FX200,0
 2120 ENDPROC
 2130 DEF PROChelp
 2140 CLS
 2150 PRINTCHR$(141)CHR$(147);"YOU AR
E NOW IN THE"CHR$(150);"HELP"CHR$(147
);"MODE"
 2160 PRINTCHR$(141)CHR$(147);"YOU AR
E NOW IN THE"CHR$(150);"HELP"CHR$(147
);"MODE"
 2170 PRINT
 2180 PRINT"If you are unable to find
 the type":PRINT"setting you want see
 if it is in another catagory eg."
 2190 PRINT
 2200 PRINTCHR$(145);"IN THE"CHR$(149
);"ALTERNATE"CHR$(145);"SETTING":PRIN
TCHR$(149);"ALTERNATE EMPHASIZED"CHR$
(145);"DOES NOT APPEAR"
 2210 PRINT
 2220 PRINTCHR$(149);"ALTERNATE EMPHA
SIZED"CHR$(145);"APPEARS AS":PRINTCHR
$(149);"EMPHASIZED ALTERNATE"CHR$(145
);"IN THE"CHR$(149);"EMPHASIZED":PRIN
TCHR$(145);"SETTING"
 2230 PRINT
```

→

Programmers' Workshop listing

From Page 149

```
 2240 PRINT"This program only deals w
ith":PRINT"combinations of two type s
ettings."
 2250 PRINT
 2260 PRINT"If you require another co
mbination use  the following chart to
 do so."
 2270 VDU31,7,23
 2280 PRINT"PRESS SPACE TO CONTINUE"
 2290 REPEAT UNTIL INKEY(-99)
 2300 CLS
 2310 PRINTCHR$(141)CHR$(147);"     P
RINTER FONT CODES"
 2320 PRINTCHR$(141)CHR$(147);"     P
RINTER FONT CODES"
 2330 PRINT
 2340 PRINT"PICA TYPE          ] VDU1,2
7,1,80"
 2350 PRINT
 2360 PRINT"ELITE              ] VDU1,2
7,1,77"
 2370 PRINT
```

```
 2380 PRINT"ENLARGED           ] VDU1,2
7,1,215,1,49"
 2390 PRINT
 2400 PRINT"CONDENSED          ] VDU1,1
5"
 2410 PRINT
 2420 PRINT"EMPHASIZED         ] VDU1,2
7,1,69"
 2430 PRINT
 2440 PRINT"DOUBLE STRIKE      ] VDU1,2
7,1,71"
 2450 PRINT
 2460 PRINT"ALTERNATE          ] VDU1,2
7,1,52"
 2470 PRINT
 2480 PRINT"UNDERLINED         ] VDU1,2
7,1,45,1,49"
 2490 PRINT''
 2500 PRINTCHR$(129);"DO YOU WISH TO
RETURN TO THE MAIN MENU?"
 2510 REPEAT UNTIL INKEY(-69) OR INKE
Y(-86)
 2520 IF INKEY(-69):PROCmenu ELSE PRO
Cesc:*FX 15
 2530 END
```

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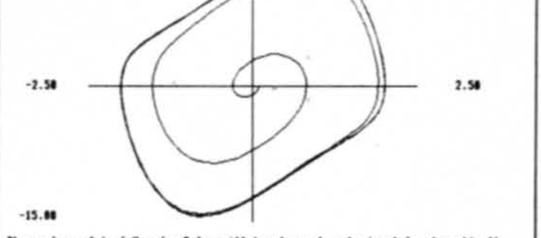

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Simon Quackers listing

From Page 115

```
  400 DEFPROCduck(n%)
  410 COLOUR132
  420 PRINTTAB(put%(0,n%),put%(1,n%))
;
  430 VDU17,7,247,10,8,8,17,1,248,17,
7,246,10,8,245,244,243,10,8,8,8,240,2
41,242
  440 ENDPROC
  450 DEFPROCquak(n%)
  460 COLOUR132
  470 *FX19
  480 PRINTTAB(put%(0,n%),put%(1,n%))
;
  490 VDU10,8,17,1,249
  500 PRINTTAB(put%(0,n%),put%(1,n%))
;
  510 SOUND 1,1,0+n%*30,5
  520 PROCwait(1):*FX19
  530 VDU10,8,17,1,248
  540 ENDPROC
  550 DEFPROCriver
  560 GCOL0,4:VDU23,1,0;0;0;0;
  570 MOVE0,100:MOVE1279,100:PLOT85,1
279,800:MOVE0,800:PLOT85,0,100
  580 PROCveg(792):PROCveg(100)
  590 ENDPROC
  600 DEFPROCveg(n%)
  610 LOCALi%
  620 GCOL0,2
  630 FORi%=0TO1272STEP8
  640 MOVEi%,n%:IFRND(3)<>1PLOT1,0,RN
D(100)
  650 NEXT
  660 ENDPROC
  670 DEFFNget(a$)
  680 LOCALb$
  690 REPEAT *FX15,1
  700 b$=GET$
  710 UNTIL INSTR(a$,b$)
  720 =b$
  730 DEFPROCsetup
  740 PROCriver:FORi%=0TO6:PROCduck(i
%):NEXT
  750 ENDPROC
  760 DEFPROCinstr
  770 COLOUR3:VDU19,1,8,0,0,0
  780 PRINTTAB(14)"INSTRUCTIONS"'':CO
LOUR2
  790 PRINT"Our friendly ducks will q
uack a song for"'"you. Listen careful
ly and then try to"''"conduct them in
 the same song."''"A duck will quack
for you if you"''"touch him with the
'light pen'."'
  800 PRINT'"If you conduct a tune co
rrectly you can"''"then try again, bu
t an extra note will"''"be added. If
you are playing at level 2"''"the tun
e will also be rewritten."'
  810 PRINT"To win you must remember
a tune of 50"''"notes."
  820 COLOUR1:PRINT'"*PRESS THE SPACE
 BAR TO START THE GAME*"''TAB(12)"GOO
D LUCK !!!"
  830 ENDPROC
  840 DEFPROCpinit
  850 P%=grab%:*FX3,6
  860 [
  870 OPT2
  880 LDX #16
  890 LDA #17
  900 STX &FE00:LDX &FE01
  910 STA &FE00:LDA &FE01
  920 RTS
  930 ]
  940 tlag%=1543:lpc%=4
  950 *FX3,0
  960 ENDPROC
  970 DEFPROClpoint
  980 REPEAT A%=ADVAL(1)DIV64:UNTIL A
%>100ANDA%<1000
  990 PROClpos
 1000 ENDPROC
 1010 DEFPROClpos
 1020 LOCALpval%:*FX19
 1030 pval%=(USR(grab%)AND&FFFF)-tlag
%:IF pval%<0pval%=0
 1040 pypos%=pval% DIV 80:pxpos%=INT(
(pval%MOD80)/lpc%)
 1050 ENDPROC
 1060 DEF FNfind
 1070 LOCALi%,r%,d%,n%
 1080 REPEAT
 1090 PROClpoint
 1100 FORi%=0TO6
 1116 r%=put%(0,i%):d%=put%(1,i%)
 1120 IF r%>=pxpos%-3AND r%<=pxpos% T
HEN IF d%>=pypos%-3 AND d%<=pypos% PR
OCquak(i%):n%=i%:i%=10
 1130 NEXT
 1140 UNTILi%>7
 1150 =n%
 1160 DEFPROCseq
 1170 LOCALi%
 1180 FORi%=0TOS%:PROCwait(1):PROCqua
k(seq%(i%)):NEXT
 1190 ENDPROC
 1200  DEFPROCwait(n%)
 1210 TIME=0:REPEAT UNTIL TIME>=n%*10
0:ENDPROC
 1220 DEFPROClost
 1230 COLOUR9:LOCALi%
 1240 VDU19,1,4,0,0,0,19,7,4,0,0,0,19
,9,7,0,0,0
 1250 FORi%=0TO6:PRINTTAB(put%(0,i%)+
1,put%(1,i%)+3)CHR$(250);:VDU10,8,251
:NEXT
 1260 VDU28,0,5,19,0:COLOUR133:CLS
 1270 PRINTTAB(0,0)"The Ducks aren't
tooimpressed with your Conducting it
seems!"'TAB(4)"Hard Luck !!"
 1280 PROCwait(8)
 1290 ENDPROC
 1300 DEFPROCagain
 1310 LOCALa$
 1320 VDU26:COLOUR128:COLOUR3:CLS
 1330 PRINTTAB(0,10)"ANOTHER GAME ?(Y
/N)"
 1340 a$=FNget("YyNn")
 1350 IF INSTR("nN",a$)CLS:END
 1360 RUN
 1370 DEFPROCwin
 1380 PROCwait(2)
 1390 COLOUR133:COLOUR0
 1400 CLS:PRINTTAB(5,10)"WELL DONE"''
TAB(2)"YOU ARE A MASTER"''
 1410 COLOUR10:PRINTTAB(5)"CONDUCKTOR
"
 1420 PROCwait(10)
 1430 ENDPROC
 1440 DEFPROCrnd
 1450 FORi%=0TO49:seq%(i%)=RND(7)-1:N
EXT
 1460 ENDPROC
 1470 DEFPROCchars
 1480 VDU23,240,63,63,63,63,31,31,31,
31
 1490 VDU23,241,255,255,255,255,255,2
55,255,255
 1500 VDU23,242,192,192,192,128,128,1
28,128,0
 1510 VDU23,243,12,8,24,48,32,224,224
,192
 1520 VDU23,244,0,0,0,0,0,255,255,255
 1530 VDU23,245,56,24,24,24,24,63,63,
63
 1540 VDU23,246,188,188,252,252,252,1
24,120,56
 1550 VDU23,247,0,0,0,0,32,112,120,24
8
 1560 VDU23,248,0,0,1,3,7,4,0,0
 1570 VDU23,249,12,2,1,0,1,2,12,0
 1580 VDU23,250,128,128,192,64,96,32,
56,62
 1590 VDU23,251,62,63,63,63,63,63,0,0
 1600 ENVELOPE 1,1,10,30,-20,3,1,1,12
7,0,0,-127,126,0
 1610 H%=0:F%=TRUE
 1620 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 189.

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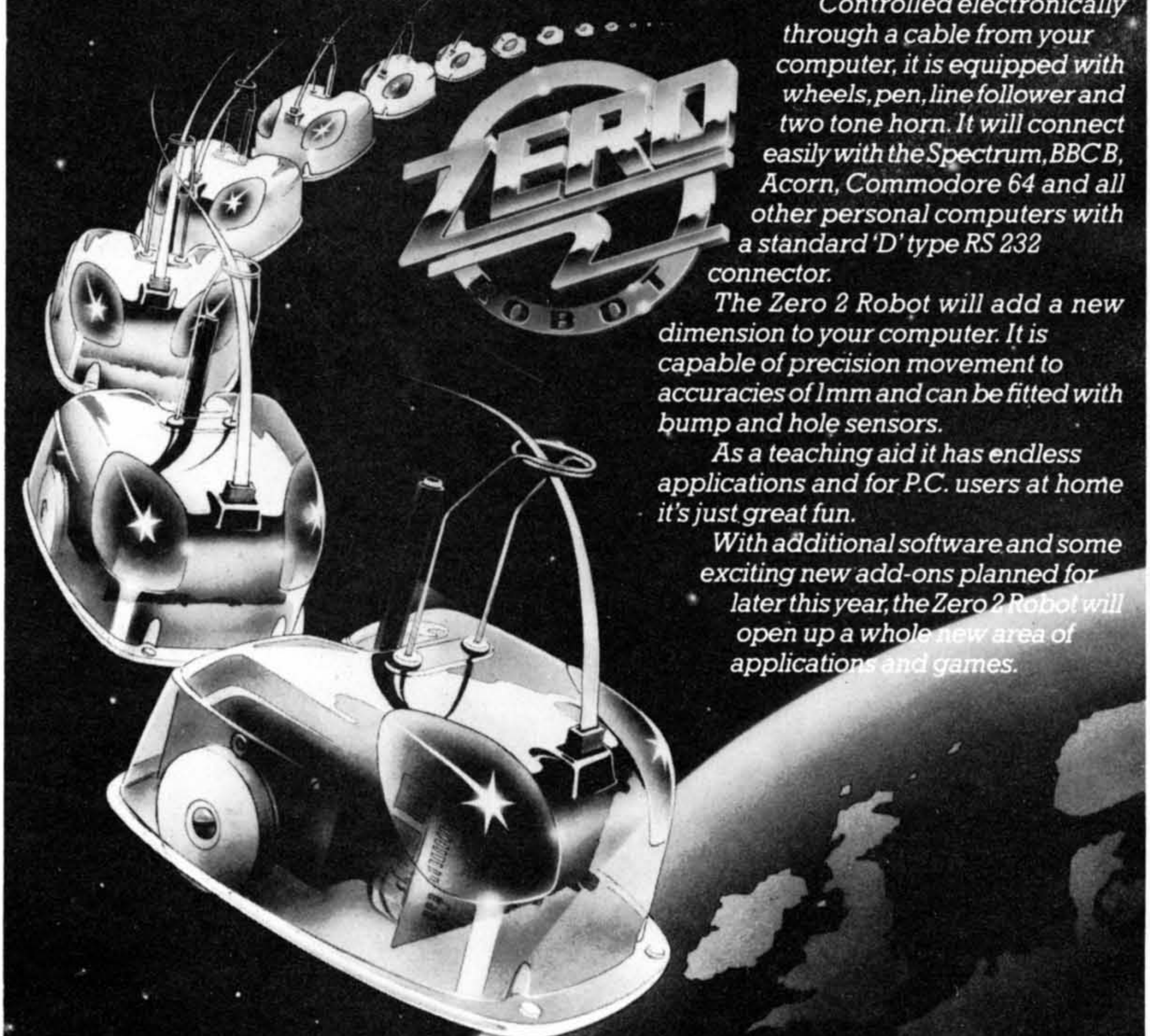

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Stripper listing

From Page 123

Listing I

```
 10 REM "Striper"
 20 REM By Robert Griffiths
 30 REM 1985
 40 REM
 50 REM (c) The Micro User
 60 OSBYTE=&FFF4
 70 OSFILE=&FFDD
 80 OSWRCH=&FFEE
 90 OSWORD=&FFF1
100 put=&70
110 end=&72
120 get=&74
130 file_out=&76
140 file_in=&78
150 fname=&7A
160 input=&7F
170
180 FORA%=0TO3STEP3:P%=&B00
190 [OPTA%
200
210 \ Disc version
220 TYA
230 CLC
240 ADC &F2
250 STA fname
260 LDA &F3
270 ADC #0
280 STA fname+1
290
300 \ Both versions
310 LDA #131
320 JSR OSBYTE
330 TXA
340 STA file_out
350 CLC
360 ADC #11
370 STA file_in
380 TYA
390 STA file_out+1
400 ADC #0
410 STA file_in+1
420 JSR set_pblock
430 LDA #&FF
440 JSR OSFILE
450 .strip2
460 LDA pblock+4
470 ORA pblock+8
480 CMP #&FF
490 BEQ strip7
500 LDA #0
 510 LDY #0
 520 .strip7a
 530 ORA (file_in),Y
 540 INY
 550 BNE strip7a
 560 CMP #0
 570 BPL strip7b
 580 .strip7
 590 LDA #7
 600 JSR OSWRCH
 610 BRK
 620 BRK
 630 EQUS "This is not a
text ASC file!"
 640 BRK
 650 .strip7b
 660 LDA file_in
 670 CLC
 680 ADC pblock+&A
 690 STA end
 700 LDA file_in+1
 710 ADC pblock+&B
 720 STA end+1
 730 LDY #10
 740 .strip8
 750 LDA header,Y
 760 STA (file_out),Y
 770 DEY
 780 BPL strip8
 790 LDY #11
 800 .strip1b
 810 LDA (file_out),Y
 820 CMP #ASC">"
 830 BNE strip1a
 840 .strip1
 850 INY
 860 LDA (file_out),Y
 870 CMP #&D
 880 BNE strip1
 890 INY
 900 JMP strip1b
 910 .strip1a
 920 DEY
 930 TYA
 940 CLC
 950 ADC file_out
 960 STA get
 970 LDA file_out+1
 980 ADC #0
 990 STA get+1
1000 LDA file_in
1010 SEC
1020 SBC #1
1030 STA put
1040 LDA file_in+1
1050 SBC #0
1060 STA put+1
1070 LDY #0
1080 JMP strip5
1090 .strip3
1100 INC get
1110 BNE strip4
1120 INC get+1
1130 .strip4
1140 INC put
1150 BNE strip5
1160 INC put+1
1170 .strip5
1180 LDA get
1190 CMP end
1200 LDA get+1
1210 SBC end+1
1220 BCS strip9
1230 LDA (get),Y
1240 STA (put),Y
1250 CMP #&D
1260 BNE strip3
1270 JSR delete
1280 .strip11
1290 LDA (get),Y
1300 CMP #ASC">"
1310 BNE strip10
1320 INC put
1330 BNE strip9
1340 INC put+1
1350 JMP strip9
1360 .strip10
1370 JMP strip4
1380 .strip9
1390 \ save file
1400 JSR set_pblock
1410 LDA #0
1420 JSR OSFILE
1430 RTS
1440
1450 .delete
1460 LDX #0
1470 .delete4
1480 INY
1490 LDA (get),Y
1500 CPX #0
1510 BNE delete3
1520 CMP #32
1530 BEQ delete4
1540 INX
1550 .delete3
1560 CMP #48
1570 BCC delete4b
1580 CMP #58
1590 BCC delete4
1600 \passed line num
1610 JMP delete4b
1620 .delete2
1630 INY
1640 LDA (get),Y
1650 .delete4b
1660 CMP #32
1670 BEQ delete2
1680 CMP #&A
1690 BEQ delete6
1700 CMP #&D
1710 BNE delete5
1720 .delete6
1730 DEY
1740 LDA (get),Y
1750 CMP #32
1760 BEQ delete5
1770 INY
1780 .delete5
1790 TYA
1800 CLC
1810 ADC get
1820 STA get
1830 LDA get+1
1840 ADC #0
1850 STA get+1
1860 LDY #0
1870 RTS
1880
1890 .set_pblock
1900 LDA fname
1910 STA pblock
1920 LDA fname+1
1930 STA pblock+1
1940 LDA file_in
1950 STA pblock+2
1960 LDA file_in+1
1970 STA pblock+3
1980 LDA #0
1990 STA pblock+6
2000 LDA file_out
2010 STA pblock+&A
2020 LDA file_out+1
2030 STA pblock+&B
2040 LDA put
2050 STA pblock+&E
2060 LDA put+1
2070 STA pblock+&F
2080 LDX #pblock MOD256
2090 LDY #pblock DIV256
2100 RTS
2110
2120 .header
2130 EQUS"NEW"
2140 EQUB &D
```

→

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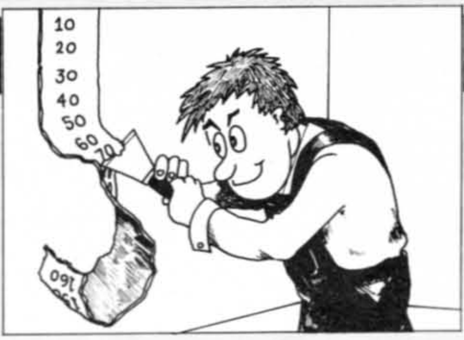
Stripper listing



From Page 156

```
2150 EQUS"AUTO"
2160 EQUB &D
2170 EQUW &0D0D
2180
2190 .pblock
2200 ]NEXT
2210 PRINT"saving the m/c
file 'strip'"
2220 *SAVE strip B00 CFF B00
2230 END
```

Listing II

```
210 \ Cassette version
220
222 LDY #&FF
224 LDA #134
226 .cas1
228 JSR OSWRCH
230 INY
232 LDA mes,Y
234 BNE cas1
236 LDX #0
238 LDA #21
240 JSR OSBYTE
242 LDA #input
244 STA fname
246 LDA #13
248 STA fname+2
250 LDA #32
252 STA fname+3
254 LDA #126
256 STA fname+4
258 LDA #0
260 STA fname+1
262 LDX #fname
264 LDY #0
266 JSR OSWORD
268 BCC cas2
270 RTS
272 .mes
274 EQUS "Which file shall
I strip? "
276 EQUB 135
278 BRK
280 .cas2
```

Listing III

```
1392 \ cassette addition
1394 LDY #0
1396 LDA #ASC"!"
1398 STA (fname),Y
```

Listing IV

```
273 \ Cassette version
274 ]$P%="Which file shall
I strip?"
275 P%=P%+LEN($P%)
276 ?P%=135:P%=P%+1:[OPTA%
624
626 \ Both versions
630 ]$P%="This is not a
text ASC file!"
632 P%=P%+LEN($P%)
634 [OPTA%
2130 ]$P%="NEW"
2140 P%=P%+LEN($P%)+1
2150 $P%="AUTO"
2160 P%=P%+LEN($P%)+1
2170 !P%=&0D0D:P%=P%+2:[OPTA%
```

This listing is included in this month's cassette tape offer. See order form on Page 189.

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Shape recognition listing

Program I

```
   10 REM OBJECT RECOGNITION
   20 REM LOADER PROGRAM
   30 REM J.M Tissandier
   40 REM(c) The Micro User
   50
   60 MODE1
   70 PROCinit
   80 PROCscreen
   90 PROCfile_system
  100 CHAIN"OR2"
  110
  120 DEFPROCinit
  130 ENVELOPE1,1,0,0,0,50,25,25,127,
-1,-1,-1,126,90
  140 *FX4,1
  150 *FX212,0
  160 *FX213,200
  170 *FX214,5
  180 VDU23,224,255,255,255,255,255,2
55,255,255
  190 VDU19,3,6;0;
  200 ENDPROC
  210
  220 DEFPROCscreen
  230 COLOUR2
  240 PRINTTAB(0,9);" MENU 1"
  250 PRINT''"D...Draw"'"E...Erase"'"
S...Skip"'"W...Wipe"
  260 PRINT'"ARROW KEYS"'" to move"
  270 PRINT'"RETURN to"'" enter"
  280 VDU28,31,23,39,9
  290 PRINT" MENU 2"
  300 PRINT''"I...Init"'"L...Load"'"Q
...Quit"'"S...Save"'"V...View"
  310 COLOUR1:COLOUR130
  320 PRINT''"Press ESCto selectthe m
enu."
  330 VDU28,10,3,29,1:COLOUR0:CLS
  340 PRINT'" OBJECT RECOGNITION"
  350 VDU28,1,30,38,26:CLS:VDU28,2,30
,38,26
  360 PRINT"The idea is to draw an ob
ject and I"
  370 PRINT"will try to recognize wha
t it is. I"
  380 PRINT"start out totally ignoran
t, but the"
  390 PRINT"more you teach me the bet
ter I get!"
  400 PRINT"Press the SPACE BAR to co
ntinue...";
  410 REPEAT UNTIL GET=32
  420 CLS
  430 ENDPROC
  440
  450 DEFPROCfile_system
  460 A%=0:Y%=0
  470 fs=USR (&FFDA) AND &F
  480 IF fs=4 THEN M%=80:PAGE=&1300 E
LSE M%=120:PAGE=&E00
  490 ENDPROC
```

Program II

```
   10 REM OBJECT RECOGNITION
   20 REM MAIN PROGRAM (Save as "OR2"
)
   30 REM(c) The Micro User
   40 PROCinit
   50 ON ERROR VDU7:IF ERR=17 THEN PR
OCadjust:menu=menu EOR 3:PROCtitle EL
SE PROCmessage(1)
   60 IF menu=1 THEN PROCmenu1 ELSE P
ROCmenu2
   70 MODE7:*FX4
   80 END
   90
  100 DEFPROCinit
  110 DIM grid%(10,10),line%(20),bit%
(20),name$(M%),rel%(M%)
  120 menu=1:n%=0
  130 f=2:b=128
  140 FOR k%=1 TO M%
  150 name$(k%)=STRING$(10,"*")
  160 name$(k%)=""
  170 IF k%<21 THEN bit%(k%)=2^(7+k%)
  180 NEXT
  190 PROCtitle
  200 ENDPROC
  210
  220 DEFPROCadjust
  230 IF n% AND name$(n%)="" THEN rel
%(n%)=0:n%=n%-1
  240 ENDPROC
  250
  260 DEFPROCtitle
  270 VDU26
  280 FOR k%=1 TO 3
  290 f=f EOR 3:b=b EOR 2
  300 COLOUR f:COLOUR b
  310 IF k%=1 PRINT TAB(0,9)" MENU 1
"
  320 IF k%=2 PRINT TAB(31,9)" MENU 2
"
  330 NEXT
  340 PROCwindow(1)
  350 ENDPROC
  360
  370 DEFPROCmenu1
  380 REPEAT
  390 PRINT"Please draw an object."
  400 PROCinitdraw
  410 PROCdraw
  420 PROCgrid
  430 PROCfindrel
  440 PROCmatch
  450 PROCnameobj
  460 UNTIL FALSE
  470 ENDPROC
  480
  490 DEFPROCmenu2
  500 REPEAT
  510 CLS:PRINT"Choice: ";
  520 o%=GET AND &DF
  530 CLS
  540 IF o%=73 THEN PROCmessage(6):RU
N
  550 IF o%=76 THEN PROCload
  560 IF o%=83 THEN PROCsave
  570 IF o%=86 THEN PROCview
  580 UNTIL o%=81
  590 ENDPROC
  600
  610 DEFPROCinitdraw
  620 PROCwindow(2)
  630 x%=1:y%=1:d=TRUE
  640 COLOUR1
  650 VDU31,1,1
  660 ENDPROC
  670
  680 DEFPROCdraw
  690 REPEAT
  700 o%=GET AND &DF
  710 IF o%=68 THEN COLOUR 1:d=TRUE
  720 IF o%=69 THEN COLOUR 3:d=TRUE
  730 IF o%=83 THEN d=FALSE
  740 IF o%=87 THEN PROCinitdraw
  750 IF o%=136 AND x%>1 THEN x%=x%-1
  760 IF o%=137 AND x%<10 THEN x%=x%+
1
  770 IF o%=138 AND y%<10 THEN y%=y%+
1
  780 IF o%=139 AND y%>1 THEN y%=y%-1
  790 IF d=TRUE AND o%<>87 THEN VDU 3
1,x%,y%,224
  800 VDU 31,x%,y%
  810 UNTIL o%=13
  820 PROCwindow(1)
  830 PRINT"Please wait...";
  840 n%=n%+1
  850 ENDPROC
  860
  870 DEFPROCgrid
  880 LOCAL x%,y%
  890 FOR x%=1 TO 10
  900 FOR y%=1 TO 10
  910 grid%(x%,y%)=POINT(464+32*x%,72
0-32*y%)
  920 NEXT:NEXT
  930 ENDPROC
```

→

Shape recognition listing

From Page 159

```
 940
 950 DEFPROCfindrel
 960 FOR r%=1 TO 3
 970 IF r%<3 THEN PROClines
 980 IF r%=1 THEN p%=0:f%=0:l%=11:mf
%=10:ml%=1
 990 IF r%=2 THEN p%=5:f%=10:l%=21:m
f%=20:ml%=11
 1000 IF r%=3 THEN p%=10:f%=0:l%=21:m
f%=10:ml%=11
 1010 REPEAT
 1020 p%=p%+1
 1030 REPEAT:f%=f%+1:UNTIL line%(f%)
OR f%=mf%
 1040 REPEAT:l%=l%-1:UNTIL line%(l%)
OR l%=ml%
 1050 IF line%(f%) AND line%(f%)=line
%(l%) AND f%<>l% THEN rel%(n%)=rel%(n
%)+bit%(p%)
 1060 UNTIL (r%<3 AND l%-f%<3) OR (r%
=3 AND (f%=10 OR l%=11))
 1070 NEXT
 1080 ENDPROC
 1090
 1100 DEFPROClines
 1110 FOR j%=1 TO 10
 1120 e%=0
 1130 FOR k%=1 TO 10
 1140 IF (r%=1 AND grid%(j%,k%)=1) OR
 (r%=2 AND grid%(k%,j%)=1) THEN e%=e%
+1
 1150 NEXT
 1160 line%(j%+10*(r%-1))=e%
 1170 IF e%>2 THEN rel%(n%)=rel%(n%)+
16^(r%-1)
 1180 NEXT
 1190 ENDPROC
 1200
 1210 DEFPROCmatch
 1220 IF n%=1 THEN ENDPROC
 1230 b%=0:m%=0
 1240 FOR k%=1 TO (n%-1)
 1250 s%=0
 1260 FOR p%=1 TO 20
 1270 v%=rel%(k%) AND bit%(p%)
 1280 vl%=rel%(n%) AND bit%(p%)
 1290 IF v%=vl% THEN s%=s%+1
 1300 NEXT
 1310 IF (rel%(k%) AND &F)=(rel%(n%)
AND &F) THEN s%=s%+1
 1320 IF (rel%(k%) AND &F0)=(rel%(n%)
 AND &F0) THEN s%=s%+1
 1330 IF s%>b% THEN b%=s%:m%=k%
 1340 NEXT
 1350 ENDPROC
 1360
 1370 DEFPROCnameobj
 1380 CLS
 1390 IF n%=1 THEN PROCnew:ENDPROC
 1400 PRINT "I think you have drawn "
;
 1410 IF INSTR("AaEeIiOoUu",LEFT$(nam
e$(m%),1)) THEN PRINT"an "; ELSE PRIN
T"a ";
 1420 PRINT name$(m%);"."
 1430 PRINT'"Am I right? ";
 1440 IF FNcheck THEN PRINT"Great!"':
PROCadjust ELSE PROCnew
 1450 ENDPROC
 1460
 1470 DEFFNcheck
 1480 REPEAT
 1490 ans=INSTR("YyNn",GET$)
 1500 UNTIL ans
 1510 CLS
 1520 IF ans<3 THEN=TRUE ELSE=FALSE
 1530
 1540 DEFPROCnew
 1550 IF n%=M% THEN PROCmessage(5):PR
OCadjust:ENDPROC
 1560 PRINT"I can't make out this obj
ect."
 1570 PRINT'"Do you want me to learn
it? ";
 1580 IF FNcheck THEN name$(n%)=FNnam
e("What is it called? ",19,10):PROCme
ssage(2) ELSE PROCadjust
 1590 CLS
 1600 PRINT"I'll try and do better th
is time."'
 1610 ENDPROC
 1620
 1630 DEFFNname(t$,t%,ml%)
 1640 REPEAT
 1650 CLS:PRINT t$;STRING$(ml%,".")
 1660 INPUT TAB(t%,0) n$
 1670 UNTIL LEN(n$)>0 AND LEN(n$)<=ml
%
 1680 =n$
 1690
 1700 DEFPROCload
 1710 c=OPENUP(FNname("LOAD FILE   Fi
lename = ",23,7))
 1720 IF c=0 THEN PROCmessage(3):ENDP
ROC
 1730 IF n% THEN FOR k%=1 TO n%:name$
(k%)="":rel%(k%)=0:NEXT
 1740 INPUT#c,n%
 1750 FOR k%=1 TO n%
 1760 INPUT#c,name$(k%),rel%(k%)
 1770 NEXT
 1780 CLOSE#c
 1790 ENDPROC
 1800
 1810 DEFPROCsave
 1820 IF n%=0 THEN PROCmessage(4):END
PROC
 1830 c=OPENOUT(FNname("SAVE FILE   F
ilename = ",23,7))
 1840 PRINT#c,n%
 1850 FOR k%=1 TO n%
 1860 PRINT#c,name$(k%),rel%(k%)
 1870 NEXT
 1880 CLOSE#c
 1890 ENDPROC
 1900
 1910 DEFPROCview
 1920 IF n%=0 THEN PROCmessage(4):END
PROC
 1930 VDU14,23,1,0;0;0;0;
 1940 PRINT"LIST OF KNOWN OBJECTS"
 1950 PRINT'"Press SHIFT..."'
 1960 FOR k%=1 TO n%
 1970 PRINT k%;". ";name$(k%)
 1980 NEXT
 1990 VDU15
 2000 PROCmessage(0)
 2010 ENDPROC
 2020
 2030 DEFPROCwindow(w%)
 2040 IF w%=1 THEN VDU28,2,30,38,27,2
3,0,10,103,0;0;0;23,0,11,8,0;0;0;:COL
OUR0:COLOUR130
 2050 IF w%=2 THEN VDU28,14,20,25,9,2
3,0,10,99,0;0;0;23,0,11,4,0;0;0;:COLO
UR131
 2060 CLS
 2070 ENDPROC
 2080
 2090 DEFPROCmessage(z%)
 2100 VDU23,1,0;0;0;0;
 2110 COLOUR1
 2120 IF z%=1 THEN REPORT:PRINT" at l
ine ";ERL;"."
 2130 IF z%=2 THEN PRINT'"Thank you."
 2140 IF z%=3 THEN PRINT'"File doesn'
t exist."
 2150 IF z%=4 THEN PRINT"No data!"
 2160 IF z%=5 THEN PRINT"Sorry, no ro
om for new objects."
 2170 IF z%=6 THEN PRINT"Initialising
...";
 2180 *FX21,0
 2190 IF z%<2 THEN d%=400 ELSE d%=200
 2200 wait=INKEY(d%)
 2210 VDU23,1,1;0;0;0;
 2220 COLOUR0
 2230 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 189.

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Future productions will include: Logo on Apple, Logo on Amstrad, Logo on Einstein. Book now to avoid disappointment.

Othello listing

From Page 70

```
  100 REM *********************
  110 REM *                   *
  120 REM *      OTHELLO      *
  130 REM *                   *
  140 REM * (c) The Micro User *
  150 REM *                   *
  160 REM *********************
  170 REM
  180 DATA 1500,-500,120,100,100,120,
-500,1500
  190 DATA -500,-1000,20,10,10,20,-10
00,-500
  200 DATA 120,20,50,30,30,50,20,120
  210 DATA 100,10,30,0,0,30,10,100
  220 DATA 100,10,30,0,0,30,10,100
  230 DATA 120,20,50,30,30,50,20,120
  240 DATA -500,-1000,20,10,10,20,-10
00,-500
  250 DATA 1500,-500,120,100,100,120,
-500,1500
  260 DATA 1,1,1,1,1,1,1,1
  270 DATA 1,1,1,1,1,1,1,1
  280 DATA 1,1,0,0,0,0,1,1
  290 DATA 1,1,0,1,1,0,1,1
  300 DATA 1,1,0,1,1,0,1,1
  310 DATA 1,1,0,0,0,0,1,1
  320 DATA 1,1,1,1,1,1,1,1
  330 DATA 1,1,1,1,1,1,1,1
  340 *TV0
  350 MODE7:VDU23;8202;0;0;0;:SD%=0:D
L%=0:ONERROR PROCgameover
  360 DIMA%(8,8),B%(8,8),C%(8,8),D%(8
,8),E%(8,8),F%(8,8),G%(8,8),PM1%(60),
PM2%(60),TPM1%(60),TPM2%(60),RG%(60),
HM%(60):A%(4,4)=1:A%(5,4)=-1:A%(4,5)=
-1:A%(5,5)=1
  370 PNT%=0:FORJ1%=1TO8:FORJ2%=1TO8:
READC%(J1%,J2%):NEXTJ2%,J1%:FORJ1%=1T
O8:FORJ2%=1TO8:READD%(J1%,J2%):NEXTJ2
%,J1%
  380 PROCstart
  390 PROCboard
  400 PL%=-1
  410 PL%=-PL%:IFPL%=1 CH%=132 ELSE C
H%=129
  420 VDU31,2,5,RND(7)+128:PRINTA$(RN
D(15))CHR$148:VDU31,22,5:PRINTSTRING$
(16,CHR$32)CHR$148;
  430 PROCposplay
  440 IFPM%=0 GO%=GO%+1:IFGO%=2 PROCg
ameover
  450 IFPM%=0 GOTO410
  460 GO%=0
  470 IFPL%=-1 PROCcompplay
  480 VDU31,2,5:IFPL%=1 VDU131,157,12
9:PRINT"  Your go   ";CHR$148;CHR$156
; ELSE VDU133,157,135:PRINT"   My go
   ";CHR$148;CHR$156;
  490 IFPL%=-1 PROCshowplay:GOTO510
  500 PROCselplay
  510 NM%=NM%+1:IFNM%=60 PROCgameover
 ELSE GOTO410
  520 DEFPROCstart:DIMA$(15):FORN%=1T
O15:READA$(N%):NEXT:ENDPROC
  530 DATA "Hmmmmm...      "
  540 DATA "Hold on...     "
  550 DATA "Just a sec...  "
  560 DATA "Won't be long.."
  570 DATA "Thinking...    "
  580 DATA "Hang on...     "
  590 DATA "Wait a moment.."
  600 DATA "Err..Ummm...   "
  610 DATA "Just a minute.."
  620 DATA "Eerrrmmm...    "
  630 DATA "Let's see now.."
  640 DATA "Here we go...  "
  650 DATA "Computing...   "
  660 DATA "Just a tick... "
  670 DATA "Pheeewwww...   "
  680 DEFPROCboard:VDU31,13,0:PRINT;C
HR$141CHR$129CHR$157CHR$131"OTHELLO
"CHR$156'SPC13;CHR$141CHR$129CHR$157C
HR$131"OTHELLO  "CHR$156:FORJ%=1TO17:
?(&7D1F+40*J%)=133:?(&7D20+40*J%)=157
:?(&7D3A+40*J%)=156:NEXT
  690 VDU31,0,4,148,183:PRINTSTRING$(
17,CHR$96);CHR$107CHR$32CHR$183STRING
$(17,CHR$96);CHR$107;:VDU31,0,5,148,1
81,31,19,5,234,31,0,6,148,245,31,20,5
,148,181,31,39,5,234,31,20,6,148,245
  700 VDU31,2,6:PRINTSTRING$(17,CHR$2
40)CHR$250CHR$32CHR$245STRING$(17,CHR
$240)CHR$250;
  710 FORJ%=1TO8:SOUND1,-15,J%*20,1:F
ORK%=1TO8:POKE%=&7D1F+J%*3+80*K%:PCE%
=A%(J%,K%):IFPCE%=0 GRAPH%=130 ELSE I
FPCE%=-1 GRAPH%=145 ELSE IFPCE%=1 GRA
PH%=148
  720 ?(POKE%-1)=GRAPH%:?POKE%=255:NE
XTK%,J%:ENDPROC
  730 DEFPROCposplay:PM%=0:FORX%=1TO8
:FORY%=1TO8:IFA%(X%,Y%)<>0 OR D%(X%,Y
%)=1 GOTO750
  740 PROCfindplay
  750 NEXTY%,X%:IFPM%=0 AND DL%=0 PRO
Cpass
  760 ENDPROC
  770 DEFPROCfindplay:OK%=0:X1%=X%:Y1
%=Y%:C%=0:REPEATC%=C%+1:PROCdirection
:J%=0:REPEATJ%=J%+1:IF(X1%+XD%)<1 OR
(X1%+XD%)>8 OR (Y1%+YD%)<1 OR (Y1%+YD
%)>8 J%=8:GOTO810
  780 X1%=X1%+XD%:Y1%=Y1%+YD%:IFA%(X1
%,Y1%)<>-PL% J%=8:GOTO810
  790 IF(X1%+XD%)<1 OR (X1%+XD%)>8 OR
 (Y1%+YD%)<1 OR (Y1%+YD%)>8 J%=8:GOTO
810
  800 IFA%(X1%+XD%,Y1%+YD%)=PL% J%=8:
C%=8:OK%=1
  810 UNTILJ%=8
  820 X1%=X%:Y1%=Y%:UNTILC%=8
  830 IFOK%=1 PM%=PM%+1:PM1%(PM%)=X%:
PM2%(PM%)=Y%
  840 ENDPROC
  850 DEFPROCdirection:ON C% GOTO860,
870,880,890,900,910,920,930
  860 XD%=0:YD%=-1:ENDPROC
  870 XD%=1:YD%=-1:ENDPROC
  880 XD%=1:YD%=0:ENDPROC
  890 XD%=1:YD%=1:ENDPROC
  900 XD%=0:YD%=1:ENDPROC
  910 XD%=-1:YD%=1:ENDPROC
  920 XD%=-1:YD%=0:ENDPROC
  930 XD%=-1:YD%=-1:ENDPROC
  940 DEFPROCselplay:ZZ%=0:SOUND1,-15
,200,1:SOUND1,-15,120,1
  950 N%=0:REPEATN%=N%+1
  960 PROCon
  970 PROCadval
  980 PROCoff:IFAD%=2 GOTO1000
  990 PROCadval:IFAD%=0 GOTO960
 1000 IFAD%=2 PROCon:ZZ%=N%:N%=PM%
 1010 UNTILN%=PM%:IFZZ%=0 GOTO950
 1020 A%(PM1%(ZZ%),PM2%(ZZ%))=PL%:PRO
Ccorner(PM1%(ZZ%),PM2%(ZZ%)):X%=PM1%(
ZZ%):Y%=PM2%(ZZ%):PROCmask(X%,Y%):PRO
Cturn:PROCboard:AD%=0:PNT%=0:ENDPROC
 1030 DEFPROCon:?(&7D1E+PM1%(N%)*3+80
*PM2%(N%))=CH%:ENDPROC
 1040 DEFPROCoff:?(&7D1E+PM1%(N%)*3+8
0*PM2%(N%))=130:ENDPROC
 1050 DEFPROCturn:PROCswapab:OK%=0:X1
%=X%:Y1%=Y%:C%=0:REPEATC%=C%+1:PROCdi
rection:J%=0:REPEATJ%=J%+1:IF(X1%+XD%
)<1 OR (X1%+XD%)>8 OR (Y1%+YD%)<1 OR
(Y1%+YD%)>8 J%=8:GOTO1090
 1060 X1%=X1%+XD%:Y1%=Y1%+YD%:IFB%(X1
%,Y1%)<>-PL% J%=8:GOTO1090
 1070 B%(X1%,Y1%)=PL%:IF(X1%+XD%)<1 O
R (X1%+XD%)>8 OR (Y1%+YD%)<1 OR (Y1%+
YD%)>8 J%=8:GOTO1090
 1080 IFB%(X1%+XD%,Y1%+YD%)=PL% J%=8:
OK%=1
 1090 UNTILJ%=8
 1100 IFOK%=1 PROCswapba:OK%=0 ELSE P
ROCswapab
 1110 X1%=X%:Y1%=Y%:UNTILC%=8:ENDPROC
 1120 DEFPROCswapab:FORJ%=1TO8:FORK%=
1TO8:B%(J%,K%)=A%(J%,K%):NEXTK%,J%:EN
DPROC
```

→

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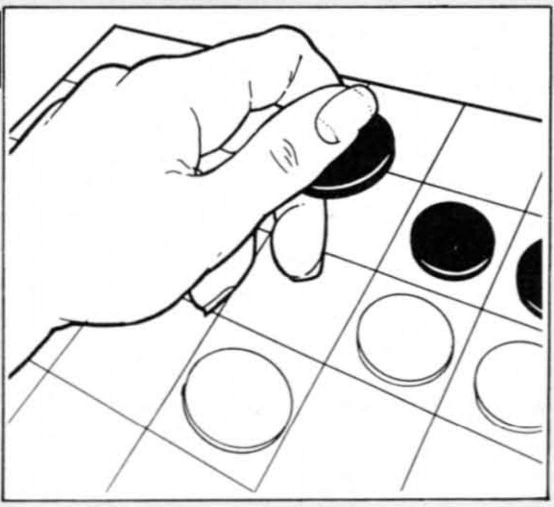
Othello listing



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```
1130 DEFPROCswapba:FORJ%=1TO8:FORK%=1TO8:A%(J%,K%)=B%(J%,K%):NEXTK%,J%:ENDPROC
1140 DEFPROCswapae:FORJ%=1TO8:FORK%=1TO8:E%(J%,K%)=A%(J%,K%):NEXTK%,J%:ENDPROC
1150 DEFPROCswapea:FORJ%=1TO8:FORK%=1TO8:A%(J%,K%)=E%(J%,K%):NEXTK%,J%:ENDPROC
1160 DEFPROCswapdf:FORJ%=1TO8:FORK%=1TO8:F%(J%,K%)=D%(J%,K%):NEXTK%,J%:ENDPROC
1170 DEFPROCswapfd:FORJ%=1TO8:FORK%=1TO8:D%(J%,K%)=F%(J%,K%):NEXTK%,J%:ENDPROC
1180 DEFPROCswapcg:FORJ%=1TO8:FORK%=1TO8:G%(J%,K%)=C%(J%,K%):NEXTK%,J%:ENDPROC
1190 DEFPROCswapgc:FORJ%=1TO8:FORK%=1TO8:C%(J%,K%)=G%(J%,K%):NEXTK%,J%:ENDPROC
1200 DEFPROCadval
1210 IFPNT%=1 AD1%=AD%:CT%=0:PROCon:REPEATCT%=CT%+1:PROCkeys:UNTILCT%=100 OR AD%=0:PROCoff:AD%=AD1%:PNT%=0:ENDPROC
1220 CT%=0:REPEATCT%=CT%+1
1230 AD%=ADVAL(0)AND3:UNTILCT%=30 OR INKEY(-99) OR INKEY(-74) OR INKEY(-82) OR AD%=1 OR AD%=2
1240 IFINKEY(-99) AD%=1 ELSE IFINKEY(-74) AD%=2 ELSE IFINKEY(-82) PROCsound
1250 IFAD%>0 PNT%=1:SOUND1,-15,25,1:SOUND1,-15,10,1 ELSE PNT%=0
1260 ENDPROC
1270 DEFPROCkeys:AD%=ADVAL(0)AND3:IFAD%=3 AD%=0
1280 IFINKEY(-99) AD%=1 ELSE IFINKEY(-74) AD%=2
1290 ENDPROC
1300 DEFPROCpass:VDU31,22,5,136,129:IFPL%=-1 PRINT"I cannot play"; ELSE PRINT"You cannot go";
1310 PRINTCHR$137CHR$148;:FORPS%=1TO50:SOUND1,-15,200,1:SOUND1,-15,120,1:NEXT:ENDPROC
1320 DEFPROCsound:SD%=SD%+1
1330 ON SD% GOTO1340,1360
1340 *FX210,0
1350 GOTO1380
1360 *FX210,1
1370 SD%=0
1380 REPEATUNTILNOTINKEY(-82):ENDPROC
1390 DEFPROCmask(XX%,YY%):FORC%=1TO8:PROCdirection:NX%=XX%+XD%:NY%=YY%+YD%:IFNX%<1 OR NX%>8 OR NY%<1 OR NY%>8 GOTO1400 ELSE D%(NX%,NY%)=0
1400 NEXT:ENDPROC
1410 DEFPROCcompplay:IFNM%>12 PROCdownlevel
1420 BM%=-3000:FORN%=1TOPM%:TC%=C%(PM1%(N%),PM2%(N%)):IFTC%>BM% BM%=TC%
1430 NEXT:FORN%=1TOPM%:RG%(N%)=N%:NEXT:FORN%=1TOPM%:FF%=RND(PM%):GG%=RND(PM%):HH%=RG%(FF%):RG%(FF%)=RG%(GG%):RG%(GG%)=HH%:NEXT
1440 N%=0:REPEATN%=N%+1:UNTILC%(PM1%(RG%(N%)),PM2%(RG%(N%)))=BM%:A%(PM1%(RG%(N%)),PM2%(RG%(N%)))=PL%:X%=PM1%(RG%(N%)):Y%=PM2%(RG%(N%))
1450 IFNM%>12 PROCswapgc
1460 PROCcorner(PM1%(RG%(N%)),PM2%(RG%(N%))):ENDPROC
1470 DEFPROCshowplay:N%=0:REPEATN%=N%+1:PROCon:SOUND1,-15,200,1:SOUND1,-15,120,1:FORWT%=1TO2000:NEXT:PROCoff:UNTILA%(PM1%(N%),PM2%(N%))=PL%:PROCon:SOUND1,-15,50,1:SOUND1,-15,35,1:PROCmask(X%,Y%):PROCturn:PROCboard:AD%=0:PNT%=0:ENDPROC
1480 DEFPROCcorner(X%,Y%):IFPL%=-1 FH%=800:TH%=500 ELSE FH%=500:TH%=300
1490 IFX%=1 AND Y%=1 C%(2,1)=FH%:C%(1,2)=FH%:C%(2,2)=TH% ELSE IFX%=1 AND Y%=8 C%(1,7)=FH%:C%(2,8)=FH%:C%(2,7)=TH% ELSE IFX%=8 AND Y%=1 C%(7,1)=FH%:C%(8,2)=FH%:C%(7,2)=TH%
1500 IFX%=8 AND Y%=8 C%(8,7)=FH%:C%(7,8)=FH%:C%(7,7)=TH%
1510 ENDPROC
1520 DEFPROCdownlevel:DL%=1:TPM%=PM%:FORJJ%=1TOPM%:TPM1%(JJ%)=PM1%(JJ%):TPM2%(JJ%)=PM2%(JJ%):NEXT
1530 FORZZ%=1TOTPM%:PL%=-1:PROCswapae:PROCswapdf:PROCcount:CO1%=CO2%:A%(TPM1%(ZZ%),TPM2%(ZZ%))=PL%:X%=PM1%(ZZ%):Y%=PM2%(ZZ%):PROCmask(X%,Y%):PROCturn:PROCcount:CO%=CO1%-CO2%*(NM%/50):PL%=1
1540 PROCposplay:HM%(ZZ%)=CO%:FORHM%=1TOPM%:HM%(ZZ%)=HM%(ZZ%)+C%(PM1%(HM%),PM2%(HM%)):NEXT:HM%(ZZ%)=HM%(ZZ%)/(PM%+1):PROCswapea:PROCswapfd:NEXT
1550 PM%=TPM%:FORJJ%=1TOPM%:PM1%(JJ%)=TPM1%(JJ%):PM2%(JJ%)=TPM2%(JJ%):NEXT
1560 PROCswapcg:FORZ%=1TOPM%:C%(PM1%(Z%),PM2%(Z%))=C%(PM1%(Z%),PM2%(Z%))-HM%(Z%):NEXT:DL%=0:PL%=-1:ENDPROC
1570 DEFPROCcount:CO%=0:CO2%=0:FORCC%=1TO8:FORCD%=1TO8:IFA%(CC%,CD%)=1 CO2%=CO2%+1 ELSE IFA%(CC%,CD%)=-1 CO%=CO%+1
1580 NEXTCD%,CC%
1590 IFDL%=0 AND CO%=0 OR DL%=0 AND CO2%=0 PROCgameover ELSE ENDPROC
1600 DEFPROCgameover:VDU31,22,5,136,129:PRINT" Game over!! ";CHR$137CHR$148:FORN%=0TO120:SOUND1,-15,N%,1:SOUND2,-15,N%+96,1:NEXT:CLS:VDU31,13,0:PRINT;CHR$141CHR$129CHR$157CHR$131"OTHELLO  "CHR$156
1610 PRINTSPC13;CHR$141CHR$129CHR$157CHR$131"OTHELLO  "CHR$156:FORZ%=250TO0STEP-50:SOUND1,-15,Z%,1:NEXT:ONERROR MODE7:END
1620 PRINT'''':PROCcount:IFCO2%>CO% PRINTCHR$133"Congratulations!! You win."'' ELSE IF CO%>CO2% PRINTCHR$132"Sorry, you lose!!"'' ELSE PRINTCHR$130"Well played!! We drew this game."''
1630 PRINT'''''CHR$131"The score was "CHR$132;CO2%;CHR$131"-"CHR$129;CO%:PRINT'''
1640 PRINTCHR$132CHR$157CHR$136CHR$129;"Press any key for another game ";CHR$156
1650 REPEATPROCkeys:UNTILAD%>0:RUN
```

This listing is included in this month's cassette tape offer. See order form on Page 189.

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MICROMAIL

Taking AMX Art a step further

I TOOK advantage of your excellent offer and bought an AMX mouse. It is a superb piece of hardware and software.

I was soon drawing pictures with the AMX Art program but, after exhausting Mr Chad etc, I found the range of backgrounds somewhat limiting (I don't design buildings).

However I soon found a way of designing my own backgrounds using the icon design program supplied by AMX and loading them into the Art program. For any of your readers who are interested, this is the way to do it:

*Run the Art program. Pull down the Options menu and select the *COMMAND. Now enter:*

```
*SAVE ICONS0 4800+400
```

This will save all the icons used by the Art program. Leave the Art program and run the icon Design program.

Load your ICONS0 in the usual way. You will find the 32 background textures are in the last eight icons (four textures, one in each quadrant of each icon).

Modify these as you please, but don't change the upper left quadrant of icon 31 or you won't have an eraser, and then save them using the Design program in the usual way as, say, ICONS1.

You will find that each texture is in fact an 8×8 grid of pixels. This gives plenty of scope for variety.

Now press Ctrl + Break and enter:

```
*LOAD ART
*LOAD ICONS1 4800
*SAVE ART1 1900+3400 1903
```

*You can now *RUN ART1 and it will contain your new 32 background textures which will be displayed and can be used as the bricks, etc, were before.* – **Gerald L. Fitton, Swindon, Wilts.**

Teletext troubles

I HAVE a BBC B and Teletext adapter which have operated completely satisfactorily over a number of months.

Recently I purchased a 6502 Second Processor, since when I have had the following problems:

- *It is not possible to get a complete Teletext display if the second processor is switched on. The display consists merely of the channel heading, and instructions to change channel/page have no effect and vanish from the screen after a second or so.*
- *With the second processor switched off (but still connected) it is not possible to get a complete Teletext display for more than a few minutes. After this period the system will only display the top portion of the screen (in varying amounts) and then goes completely dead (although pressing Break will restore it briefly until the same happens again).*

No changes have been made to the equipment other than to replace the original DFS ROM with the DNFS ROM supplied with the second processor.

So far as I can tell, there are no problems in using Basic or Hi-Basic with the second processor.

On the face of it, the second processor does not appear to be compatible with the Teletext system since I have discovered that Teletext will operate normally if, and only if, the second processor is disconnected.

As you will appreciate, this is not a long-term solution and I should be grateful for any help you can give which will allow me to operate Teletext with the second processor permanently connected. – **J.S. Ridler, Pinner, Middlesex.**

- The Teletext system is not second processor compatible.

However there should be no problems with Teletext if the second processor is attached and switched off.

There appears to be a hardware fault causing your problem.

Mornington Crescent tip

I HAVE searched for something fresh to read and act as a hobby for some 20 years and having been disillusioned by the repetitive articles in DIY magazines I was delighted to be able to take some little interest in computing.

Still considering myself a raw recruit I launched into purchase of all dedicated (BBC) periodicals some 19 months ago.

After this period I am convinced that Micro User is the most consistent in its friendly and balanced reporting and program content.

Its support services are also most commendable.

A magazine that caters for all levels of interest must be recommended.

What a delight to see Mike Cook's program "Mornington Crescent". It must be nearly 36 years ago since I first played the board version of this.

I was then working at Northern Polytechnic, Holloway, where the game became a firm favourite with the staff.

Many hours were spent explaining the rules to newcomers so it was particularly pleasing to see how much more succinctly Mike placed these in his program.

Without wishing to be a spoilsport, a tip to the beginner: When prompted to start, make sure you are on a different line to your opponent. This gives you a greater number of variables to play with.

To keep on the right lines without being sidetracked is the real art of the game. – **Tony Lawrance, Wigston, Leicester.**

- Thank you so much. It really is nice to be appreciated. A lot of the credit, though, must go to our readers. As you can see from Micromail, we get a lot of valuable feedback from our readers – which we act on.

Sluggish snail

I AM interested in buying a machine code monitor ROM for my BBC Micro and would appreciate your comments/suggestions on the devices listed below.

I already have Disc Doctor and Caretaker fitted to my machine and realise that some of the facilities provided by these two chips may be duplicated by the installation of a monitor ROM – memory, display etc.

However I still feel that purchasing a monitor ROM would be beneficial as I intend to master (in time!) machine-code.

Could you also suggest a solution to the following problem? A friend at work has a BBC B (1.2 OS, Basic 2) with speech synthesiser fitted and an original copy of Centipede by Superior Software.

The program seems to run correctly except that the Spider, Snail and Fly never appear on the screen.

The program has been tried on another identical machine (1.2 OS, Basic 2, speech synth) with the same results. However on my machine (no speech synth) it runs perfectly.

Machine-code monitor ROMs: Gremlin by Computer Concepts. Exmon 2 by Beebug-

From Page 169

soft. Ade by System Software. – **G.A. Smith, Kirkby-in-Ashfield, Notts.**

PS: Is there any truth in the rumour that Acorn is going to produce a machine later this year that has 64k RAM fitted as standard?

● As you've already deduced, there is a software/speech processor "clash" with the Superior Software game.

Dealers have known about this problem since shortly after the speech processor was released.

The only way around the problem is to go to the dealer who supplied you with the product.

Monitors need to be able to go through programs one step at a time, or to stop where you want it to stop to examine the register and flags. Beebmon and Exmon are simple and effective. Ade is much more complex but its macro assembler makes it suitable for larger programs.

For first news of the new machine, see Page 23.

Recovering lost listings

IN your reply to a letter by John Unsworth in the February 1985 edition of The Micro User you said that there was no way of recovering all of his unfortunately wiped off program.

I agree that you cannot recover every single line, but suggest this method which will hopefully recover as much as possible.

First type in Listing I then save the machine code using:

```
*SAVE"Code" C00+49
```

Next position your tape just before the first remaining block on the tape. Then type in:

```
*OPT2,0
*LOAD""
```

and load in the remaining blocks of your program. It is important that you ignore all "Bad Program" errors as we are working with a chunk of code, not a Basic program for the moment. Then type in:

```
*OPT2,1
*RUN"Code"
```

and run the machine code program you saved earlier (still ignoring "Bad Program" errors). Next type in:

```
PRINT~!&70 :REM (to get aaaa)
PRINT~!&74 :REM (to get bbbb)

*SAVE"Prog" aaaa bbbb
```

Then load in your earlier copy of your program (the one that has not been partially wiped off) and enter:

```
PRINT~(TOP-2): REM
(to get cccc)

*LOAD"Prog" cccc
RENUMBER
LIST
```

and hey presto, you have the salvaged lines of the later program joined onto the first program.

I hope that this has not been too hard to follow and I wish you luck. – **Olly Stephens, Chelmsford.**

```
   10 REM LISTING I
   20 REM
   30 REM BEGINNING AND
   40 REM END FINDER
   50 REM OLLY STEPHENS
   60 REM
   70 REM
   80 FOR opt% = 0 TO 3
   90P%=&C00
  100[
  110 OPT opt%
  120 LDA #0
  130 STA &70
  140 STA &72
  150 STA &73
  160 STA &76
  170 STA &77
  180 LDA &14
  190 STA &71
  200 LDY #0
  210 .Loop1 LDA (&70),Y
  220 CMP #13
  230 BEQ Yes1
  240 LDA #1
  250 CLC
  260 ADC &70
  270 STA &70
  280 LDA #0
  290 ADC &71
  300 STA &71
  310 JMP Loop1
  320 .Yes1 LDA &70
  330 STA &74
  340 LDA &71
  350 STA &75
  360 LDY #0
  370 .Loop2 LDA (&74),Y
  380 CMP #255
  390 BEQ Yes2
  400 LDA #1
  410 CLC
  420 ADC &74
  430 STA &74
  440 LDA #0
  450 ADC &75
  460 STA &75
  470 JMP Loop2
  480 .Yes2 RTS
  490 ]
  500 NEXT
  510 END
```

Right on track

THE Atari Trak-Ball was well worth waiting for. It is superbly engineered, made in USA, not Taiwan, and I note is a superior model to that originally illustrated.

You obviously went to a lot of trouble and I suspect that readers like myself have now ended up with something worth a lot more money. – **George Nicholson, Chelmsford, Essex.**

● We're rather pleased with it, too. In fact, we've just launched a magazine called Atari User. How's that for being impressed with a product?

Working Miner

MANY thanks for your prompt response to my problem with the listing of Miner Bill. I was much abashed to discover the very basic (no pun intended) errors that I overlooked in my listing.

I can only apologise for the trouble I put you to. In mitigation I can say that I wrote to you only after spending many hours myself and under pressure from my young son to solve the dilemma.

However I have taken your advice and run the program correcting each error as it arose, culminating in a fascinating game. – **Anonymous.**

● We're always glad to help uncover people's typing errors if we can. Of course we can't provide a comprehensive debugging service, but if you enclose an s.a.e. and are patient – we get a lot of mail – we might be able to point you in the right direction.

The listings we publish are correct – if a program won't run, it's odds-on you've slipped up typing it in!

Good service

I WOULD like to express my appreciation at the helpful service given by Aries.

I had purchased a B20 board and already had a sideways RAM from Solidisk. This worked fine until I bought a B12 sideways ROM board. They wouldn't work together.

When I contacted Aries, they were very helpful and over a period of a month exchanged bits and pieces until in the end they had devised a hardware modification which enables a B12 to work with the Solidisk sideways RAM board (SWR 16 & 32 only).

This gives 12 ROMs plus two sideways (if SWR 32 is used) slots at E and F. This is much

● *Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.*

more convenient than external ZIF sockets.

I understand that this modification is now available at a very reasonable cost and details are available from Aries Computers. – **Malcolm Jones, Mulbarton, Norwich.**

● With the coming shake-up in the micro world, it's becoming apparent which are the firms likely to survive ... those who, like Aries, treat their customers as clients – not just sources of cash!

★ ★ ★

UNTIL last week I owned a single Cumana CS100 disc drive and was extremely pleased with its performance. So, when I required to expand my disc system, I had no hesitation in choosing another Cumana disc drive unit.

My choice was a CS400. (I originally wanted a CS400E, but delivery time persuaded me otherwise.)

After resetting the link in the CS100 to Drive 1 and connecting the ribbon cable to both drives, the CS100 failed to LOAD/CHAIN or even BACKUP a program. The time was 5 o'clock on a Friday night and so I hesitantly telephoned Cumana.

A Mr Hodgkiss, who answered, asked me for my telephone number to enable him to call me, therefore keeping down my telephone costs.

After an hour on the telephone, the problem was resolved.

If any other reader is experiencing like problems, the answer is:

- *Remove the resistor RA 11 from the CS100. This is situated beside the drive links.*
- *On the CS400 power supply board there are two solder pads at the opposite end on the PCB from the 40/80 track switch leads. These pads require soldering together.*

I would like to say a public thank-you to Cumana for their professionalism and excellent customer relationships. – **Bill Simpson, Lytham, Lancs.**

● Well done, Cumana. Service of this calibre can only win you more customers.

Disc directive

I WONDER if you would be interested in publishing this small program which I wrote to overcome an annoying feature of having both 3in and 5¼in drives.

*Some of my programs are on one format, others on the other, and as both drives are connected in tandem (3in is drive 0, larger is drive 1) I was annoyed at forever having to type *DRIVE 1 after each reset to access the larger discs.*

So I wrote the following program, which does the job after every Break or Control-+Break.

```
   10 REM:*****************
******
   20 REM:*  Break protecti
on   *
   30 REM:*****************
******
   40 REM:.......by P.Lee..
......
   50 REM:A$ should contain
 the command
   60 REM:you wish executed
 on BREAK or
   70 REM:CONTROL BREAK. It
 can be
   80 REM:an Operating syst
em call (*)
   90 REM:command, or a str
aightforward
  100 REM:OLD |M RUN|M to p
revent
  110 REM:unauthorised esca
ping from
  120 REM:the program.
  130 REM:For BASIC/O.S com
mands
  140 REM:which use quotes,
 A$ must be
  150 REM:changed to contai
n double
  160 REM:quotes.
  170 REM:eg. A$="CHAIN ""M
ENU""|M"
  180 REM:If the string doe
s not
  190 REM:contain a valid c
ommand an
  200 REM:error will be pro
duced.
  210 REM:*****************
******
  220 A$="*DRIVE 1|M"
  230 B$="*K.0":C$=B$+A$
  240 P%=&A00
  250 string%=P%+&15
  260 $string%=C$
  270 FORI%=0TO3STEP3
  280 *FX247,76
  290 *FX248,0
  300 *FX249,10
  310 P%=&A00
  320 [OPT I%
  330 BCC command
  340 RTS
  350 .command
  360 LDX#string% MOD &100
  370 LDY#string% DIV &100
  380 JSR&FFF7
  390 LDA#138
  400 LDX#0
  410 LDY#128
  420 JSR&FFF4
  430 RTS
  440 ]
  450 NEXT
  460 REM:*****************
*********
  470 REM:The command is in
serted into
  480 REM:function key 0. T
his is
  490 REM:called up each ti
me BREAK is
  500 REM:pressed.
  510 REM:As it stands, A$
executes
  520 REM:a *DRIVE 1 command.
  530 REM:Changing A$ allow
s you to
  540 REM:execute any comma
nd(s) you
  550 REM:want.
  560 REM:A good use is to
change to
  570 REM:another screen mo
de.
  580 REM:*****************
*********
```

There is no limit to the way the program can be tailored to suit individual requirements. Any legitimate command may be put into A$, and this will be carried out even after a hard re-set.

*An obvious and simple routine would put OLD|M RUN|M into A$ so that if BREAK were pressed, the program would automatically run, and this, together with the use of *FX200,1 (which disables Escape) would afford some degree of program protection.*

They way it works is, on pressing the Break key, to make the computer jump to the address held in locations &288,&289 – in my case I chose &A00 as relatively safe on both a disc and tape system – and execute the code held there.

The code at &A00 is very short: It firstly points to the address of A$, and then treats this is a star command by jumping to the Command Line Interpreter at &FFF7. It then puts the value of the function key 0 in the buffer and executes it – carrying out the command held in A$. And this happens each time Break is pressed.

The reason for the BCC instruction is because on Break, the computer executes the code twice, once with the carry flag at zero, the other time at 1. So to prevent execution of the command twice in succession it is necessary to check this condition and only act once. – **Peter Lee, Mexborough, S. Yorks.**

Locating blanks

THOSE of us who have only a cassette filing system seem to be expected to have an inexhaustible supply of blank tapes or to have so organised ourselves that we always have a tape handy which we have previously wound on to a blank section prior to

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loading a program.

How many of us have been asked, when running a proprietary program, to load a tape ready to record a file and have found that we have no way of locating a blank section.

In my programs I always include the following code which will allow a blank section to be found before recording. I wish more software writers would do the same.

Unfortunately, it cannot be included in a procedure or function, but this is not really a drawback.

```
70 PRINT"Insert cassette
and press PLAY"'"Files will
be listed.When you
find"'"the place you want
to record"'"press Escape."
80 ON ERROR GOTO 100
90 *CAT.
100 ON ERROR REPORT:STOP
110 PRINT"Press REC and
PLAY,"'"then andy key to
continue.Be ready"'"to
press RETURN when the
message"'"appears."
120 G%=GET
130 PROCwrite
140 .......etc
....
....
500 DEFPROCwrite
510 X%=OPENOUT(File$)
520 ....etc
```

– D.G. Coleman, Ilford, Essex.

● This seems to be a very useful routine and we hope many cassette-users gain as much benefit from it as Mr Coleman obviously has done.

Shifting fields

REGARDING the shifting fields problem in April Micromail, there is a simple explanation.

The reason for the shift in field is due to the way the printed bytes are counted.

The zero page location &1E counts the printed bytes per line but can only count up to 255 then zeros.

As 255 is not a multiple of 10 the field looks as if it had changed – but it has not, it is the byte count that is wrong.

The program below will demonstrate this:

```
10 FOR A=0 TO 20
20 PRINT ?&1E,A;
30 NEXT A
```

When you run this program you will notice that when A=13 count=4 and not 260 which would be required for correct field position.

Add line below to solve problem.

```
15 IF ?&1E<10 THEN ?&1E=0
```

I hope this answers your question. – **A. Cook, Renfrew.**

● We are grateful to Mr Cook for answering this problem. His was one of many replies and naturally we can't publish them all, but we do thank all the people who responded.

Mini giants

THANK you very much for Mini Office – the best word processor I have, not to mention spreadsheet, database and graphics.

Please, please could you tell me how you got those letters as big as you did? You see I am writing a program to do my dad's telephone numbers on. I intend to start each section with one of those fabulous double height and double width letters then the rest in double height letters.

I will be, as usual, awaiting the arrival of your fabulous magazine hopeful of a reply.

Incidentally, how did you get the REMs in your loader program to stop the listing? – **Jamie Gilbert, Truro, Cornwall.**

● Thank you for your letter. The techniques you require are quite complex, but here is a listing of a double height routine that may help you. Used in Mode 5 it gives the same results as Mini Office.

A simple way to stop listings is to put the first line of your program:

```
10 REM ####
```

then type in:

```
?(PAGE+6)=21
```

This puts a code in the first character in the REM to turn the VDU off.

```
   10 REM DOUBLE HEIGHT
   20 REM WORKS IN MOST MOD
ES
   30 INPUT"TYPE IN WORDS
"W$
   40 MODE 5
   50 PROCASS
   60 PROCDBL(W$,20):REM (W
ORDS,Y POS)
   70 END
   80 DEFPROCDBL(A$,y%)PRIN
TTAB((19-LENA$)/2,y%);:FOR
CH%=1 TO LEN A$:A%= ASCMID$
(A$,CH%,1):CALLd:NEXT:ENDPR
OC
  100 DEFPROCASS DIMMC%100
  110 FOR I%=0 TO 2 STEP 2
  120 P%=MC%
  130 [OPTI%:.d STAb:LDA #1
0
  140 LDX#b AND 255:LDY #b
DIV 256
  150 JSR &FFF1:LDA #0:STAj
  160 .d1 LDA #23
  170 JSR &FFEE:LDAj:ORA #2
24:JSR &FFEE:LDAj:ASLA:ASLA
:TAX:LDY #4
  180 .d2 INX:LDAb,X:JSR &F
FEE:JSR &FFEE:DEY:BNE d2:IN
Cj:LDAj
  190 CMP #2:BNE d1:LDX #4:
.d3 LDAs,X
  200 JSR &FFEE:DEX:BPLd3:R
TS
  210 .b:]
  220 j=b+9:s=j+1
  230 $s=CHR$11+CHR$225+CHR
$8+CHR$10+CHR$224:NEXT:ENDP
ROC
```

If . . .

IF you can keep your head while all about you have sent their missiles homing in on you;
If you can hyperspace before the Thargoids have zapped your front shields and your rear shields too;
If you can down a Python, Krait or Mamba with any laser – left, right, front or rear;
If you can work the keyboard and the joystick and at the same time sip a can of beer;
If you can trade with anarchies and feudals and treat their hordes of pirates with disdain;
If you can sell them cargoes of computers – bought at a pittance – for enormous gain;
If you can make a heap of all your winnings and risk it at one turn of pitch and toss;
Then fight through to a Coriolis station and save your game before the battle's lost;
If you can search for military lasers, to give your Mark Three Cobra extra clout;
And stick to your resolve and keep on searching – though every planet seems to have sold out;
If you can rise from Harmless up to Deadly before the course of seven days is run;
Yours is the galaxy and all that's in it;
And, which is more, you'll be Elite, my son!

Commander Kipling (Harmless).

But I do make an exceedingly good cake!

– Tim Kik, Hazel Grove, Stockport.

Shinwa pleases

HAVING read three interesting letters (one in January, two in April) concerning (knocking?) the Shinwa CP80 printer, I must write in its defence.

I have a Model B 1.2 OS, Acorn DFS, disc drives, and a board full of ROMs, plus a CP80 printer.

The odd bits of "corrupted" English in the user manual are no more than that in amateur radio manuals, car manuals, hi-fi and the like, and don't put me off at all.

The programming examples are for something like the TRS 80 but there is no problem on the BBC by intelligent application of *the printer control codes.*

I set the DIP switches correct (for me) the first time including the slashed zeros.

All the control codes are listed in the user manual and all work well.

The prime difference between the CP80 and the Epson is the pound sign, which is no problem, and the price.

The bit-image mode is handled well by D&A Computers GDUMP including tones, and DESIGN.

The large size plot tends to be elongated as it does with other printers except the Epson. I believe that Watford's DUMPOUT has even corrected this.

As well as domestic use, I have used the printer, together with Wordwise and now Wordwise Plus, extensively with my work in the pilot training side of civil aviation and have had no problems at all with either reliability or quality of printout.

I hope that Mr Jupp and Mr Hawthorne have overcome their teething troubles and are now enjoying and using this versatile workhorse which I can recommend to anyone. – **Captain B. Armstrong, Horsham, W. Sussex.**

Changing channels

HAVING tried out the machine code "Interrupt" routine featured last December in your Carol program in one of my own programs, I wished to investigate further.

Could you tell me how to get the music to play on a different channel other than Channel One, or even on more than one channel, so as to get harmony?

Also, if the machine code were to be assembled at a location other than at &900 (Page 9), would it be possible to load and save programs – even machine code programs – while the music plays on, as featured in a lot of commercial games that play music as they load the main program?

Thanks for a super magazine – it's a great help, even for relative experts like myself, as well as complete novices, like my dad! – **Mark Aguera, Hampton, Middlesex.**

● Line 480 sets the sound channel to 1 and line 500 sets the volume to maximum. You can easily alter these if you wish but to produce two or three-part harmony would be quite difficult unless you are an expert machine code programmer.

Programs can be loaded and saved provided that the memory used by the machine code or data does not clash with the incoming or outgoing program.

Faster circles

I READ with interest the plea for increased speed in the letter by S.J. Stewart in the February 1985 issue of The Micro User. It is possible that I may be able to help here.

For some time now I have been developing a new approach which, among other things, calculates sines, cos, tans etc without invoking the Basic subroutines.

As the fundamental algorithm is very simple, considerable increase of speed may be obtained.

I include a listing for a fast circle generator as a demonstration.

It will be noticed that, although sines and cosines are involved, no calls have been made to the Basic subroutines.

This program prompts for a scale – which is an integer in the range 1-6 – which determines the number of points plotted.

A circle is drawn and also the time taken is printed. Typing C for continue returns to the prompt so that another scale may be tried.

Incidentally, scale 7 gives chaos because it breaks down the twos complement sign convention.

I noticed Mike Cook did an article on circle generation in the December issue. He might be interested in trying this for size.

However this is only a very simple example of the technique. It is possible by setting up suitable configurations of the

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MICROMAIL

```
   10 REM CIRCLE GENERATOR
   20 REM P.L OWEN
   30 OSWRCH=&FFEE
   40 DIM PROG &200
   50  FOR opt%=0TO2 STEP 2
   60 P%=PROG
   70 [OPT opt%
   80 .START LDA XL
   90 STA I1
  100 LDA XH
  110 STA I2
  120 BPL L6
  130 LDA #&FF
  140 JMP L7
  150 .L6 LDA #0
  160 .L7 STA I3
  170 LDX N
  180 .L8 BEQ L9
  190 ASL I1
  200 ROL I2
  210 ROL I3
  220 DEX
  230 JMP L8
  240 .L9 LDA YL
  250 CLC
  260 ADC I2
  270 STA YL
  280 LDA YH
  290 ADC I3
  300 STA YH
  310 LDA YL
  320 STA I1
  330 LDA YH
  340 STA I2
  350 BPL L10
  360 LDA #&FF
  370 JMP L11
  380 .L10 LDA #0
  390 .L11 STA I3
  400 LDX N
  410 .L12 BEQ L13
  420 ASL I1
  430 ROL I2
  440 ROL I3
  450 DEX
  460 JMP L12
  470 .L13 LDA XL
  480 SEC
  490 SBC I2
  500 STA XL
  510 LDA XH
  520 STA XH1
  530 SBC I3
  540 STA XH
  541 CLC
  542 ADC XH1
  543 STA XH2
  550 ROR XH2
  551 LDA XH
  552 EOR XH1
  553 AND #&80
  554 EOR XH2
  555 STA XH2
  660 .C1 LDA X0
  670 CLC
  680 ADC XH2
  690 STA X
  700 LDA X0+1
  710 ADC #0
  720 STA X+1
  730 LDA XH2
  740 BPL L1
  750 DEC X+1
  760 .L1 LDA Y0
  770 CLC
  780 ADC YH
  790 STA Y
  800 LDA Y0+1
  810 ADC #0
  820 STA Y+1
  830 LDA YH
  840 BPL L2
  850 DEC Y+1
  860 .L2 LDX #0
  870 .L3 CPX #6
  880 BEQ L4
  890 LDA DRW,X
  900 JSR OSWRCH
  910 INX
  920 JMP L3
  930 .L4 LDA SL
  940 SEC
  950 SBC #1
  960 STA SL
  970 LDA SH
  980 SBC #0
  990 STA SH
 1000 LDA SL
 1010 BNE L5
 1020 LDA SH
 1030 BEQ EXIT
 1040 .L5 JMP START
 1050 .EXIT RTS
 1060 ]
 1070 XL=P%
 1080 XH=P%+1
 1090 YL=P%+2
 1100 YH=P%+3
 1110 XH1=P%+20
 1120 XH2=P%+21
 1130 I1=P%+4
 1140 I2=P%+5
 1150 I3=P%+6
 1160 N=P%+7
 1170 X0=P%+8
 1180 Y0=P%+10
 1190 DRW=P%+12
 1200 X=P%+14
 1210 Y=P%+16
 1220 SL=P%+18
 1230 SH=P%+19
 1240 XH1=P%+20
 1250 XH2=P%+21
 1260 P%=P%+22
 1270 NEXT
 1280 MODE 4
 1290 VDU 26
 1300 CLS
 1310 ?XL=0:?XH=127:
?XH1=127
 1320 ?YL=0:?YH=0
 1330 ?DRW=25
 1340 DRW?1=5
 1350 ?X0=244
 1360 X0?1=1
 1370 ?Y0=244
 1380 Y0?1=1
 1390 MOVE 500+?XH,
500+?YH
 1400 INPUT "SCALE  "SCALE
 1410 ?N=SCALE
 1420 SCL=2^SCALE
 1430 steps=1600 DIV SCL
 1440 ?SL=steps MOD 256
 1450 ?SH=steps DIV 256
 1460 TIME=0
 1470 CALL PROG
 1480 PRINT "TIME TAKEN",TI
ME''"POINTS",steps
 1490 IF GET$="C" THEN
1300
 1500 END
```

From Page 173

basic algorithm to solve a very wide range of problems.

I have, for instance, a working program which simulates a second order servo system. This, compared with a conventional Basic program, gives an increase in speed of about 40 to 1. – **P.L. Owen, Malvern, Worcs.**

Fiddling

I HAVE translated some music from script to my BBC B that is a solo concertino for a violin. The trouble is the sound does not sound like a violin. So does anyone know of an ENVELOPE statement that sounds like a violin? – **Anthony Stewart, Harrogate, N. Yorks.**

● This is another for our readers. Have we a "micro-Menhuin" out there with the answer?

ROM selection

IN February's Micro User, you have an Ultimate Disassembler, with which, you say, "the contents of the paged ROMs can be examined". Also: "R allows any of the paged ROMs to be selected for disassembling or dumping".

But how exactly is this done?

I can see no way of either disassembling the ROMs or dumping them to disc.

I am curious about how the ROMs do the things they do and your program seemed an excellent way to find out. However I am in no better position to find out than when I started typing in your program.

It is an excellent program as it stands, but please could you let me know how to go about disassembling sideways ROMs or dumping them to disc. – **A.K. Sowter, Epping, Essex.**

● Look at the titles of the ROMs with option W – this will list the titles with the socket number.

Select the ROM to look at with option R followed by the socket number.

Then memory dump (option M) or Disassemble (option D) from address &8000 – up to &9FFF if an 8k eprom (it will repeat itself from &A000 to &BFFF) or up to &BFFF if it is 16k long.

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- ○ *1 Cartridge Rack (stores cartridges safely when not in use, also expands to a Library System).*
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MU6/2

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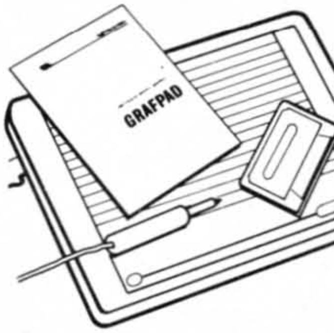

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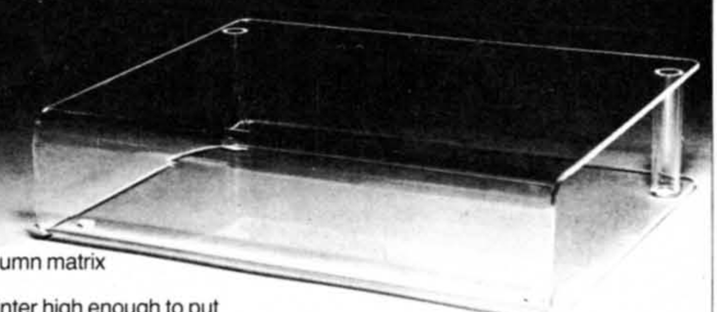

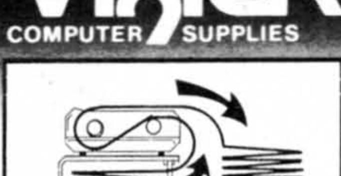

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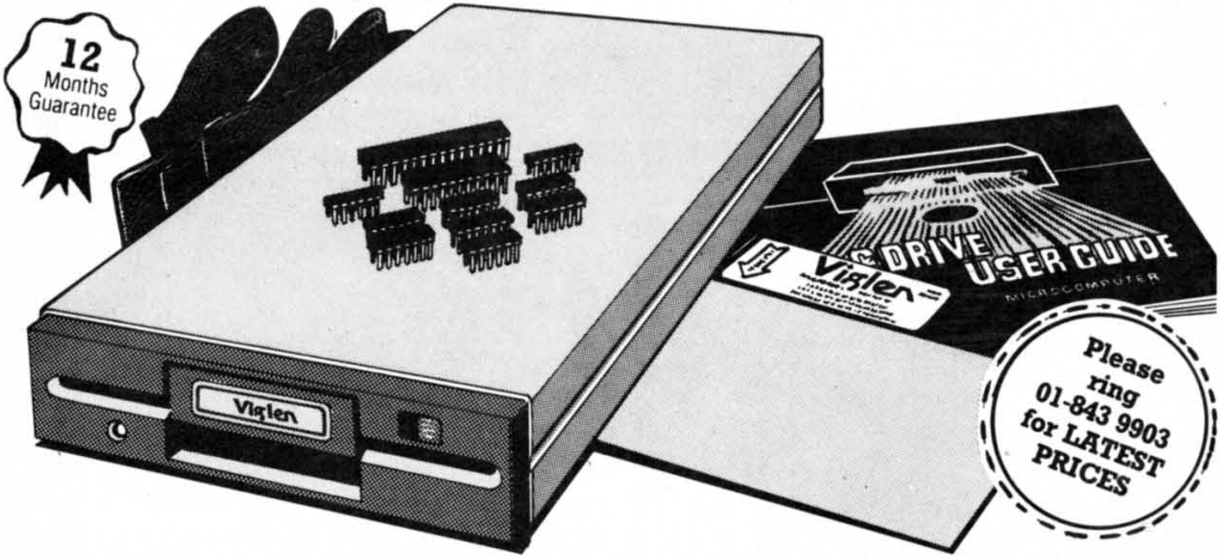

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This offer includes the latest 1.2 version of Acorn Interface DNFS.

Complete Disk System for the BBC Model B

- *Package assumes you own a BBC Model B with 1.2 operating system.* with power outlet

OFFER INCLUDES THE FOLLOWING:-

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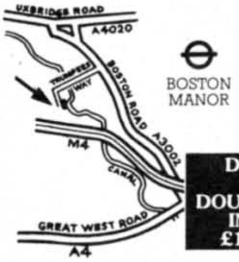

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DOUBLE DENSITY INTERFACE
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- 12" high resolution, 20MHz band width, anti-glare screen
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- Suitable for the following computers:
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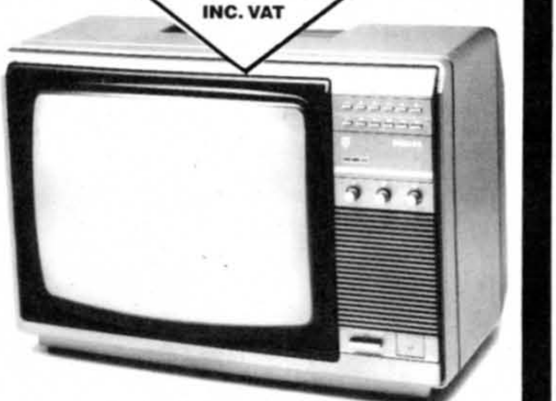
Test Bureau Recommended



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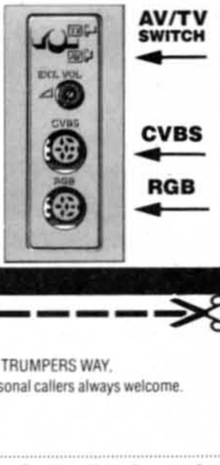
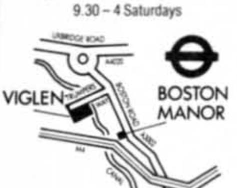
This very popular unit is not only an excellent Colour Television Receiver, but also a sophisticated computer monitor. Featuring:

- Free lead supplied for BBC Micro
- Headphone socket and speaker mute switch
- RGB, (TTL and can be modified for linear), Composite Video Input (CVBS), Audio Input plus this model has an AV/TV switch
- 14" picture tube with 0.65mm resolution
- Maximum 80 characters per line 20MHz band width
- 12 pre-select buttons
- Aerial supplied
- Swivel base extra £13.95 inc. VAT



Open 9.30 – 6 weekdays,
9.30 – 4 Saturdays



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The BBC Model B

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Disk Storage No.1

This diskette storage holds 70 diskettes

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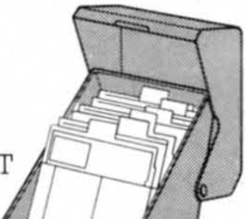

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5¼″ diskettes single sided

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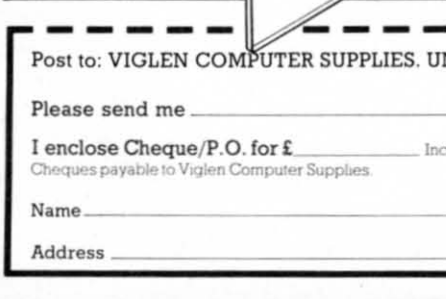

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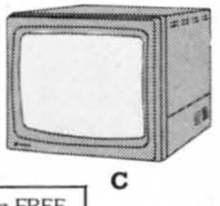

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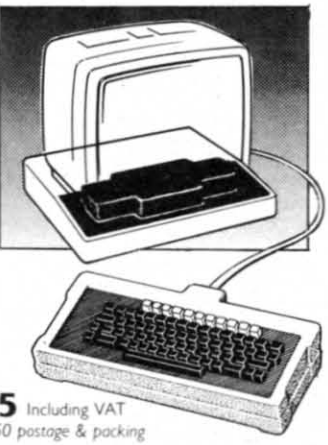
Best Service - Best Value from Viglen

BBC Micro Remote Keyboard

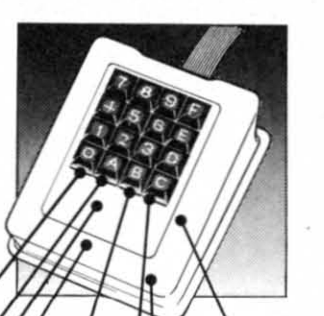
The Viglen keyboard extension frees you from the confines of your computer, with a long 1½ metre lead which enables you to place your keyboard anywhere on your desk, even on your lap, away from your computer hardware. It consists of a high quality ABS plastic case, colour matched to the BBC, which encloses your BBC keyboard. A monitor support is then fitted to the computer in the space vacated by the keyboard. This then enables you to use the computer as a monitor stand. The keyboard extension comes complete with comprehensive fitting instructions.



Price: **£29.95** Including VAT
Please add £3.50 postage & packing

The Viglen Keypad

Ideal for business use, word processing, programming etc. High quality construction with unrivalled specification. Uses 1MHz Bus unlike other systems.



Full travel Keys.

Each key fully programmable with a simple command. Giving total flexibility.

Built in RAM chip - uses none of the BBC's memory.

Key definitions can be saved on disc or tape.

Plug in Eprom contains operating software.

Fully compatible with other peripherals.

Compatible with BBC keyboard i.e. 2 key rollover, same auto repeat rate.

Fully relegendable version, just £10 extra.

Price: **£69.95** Including VAT
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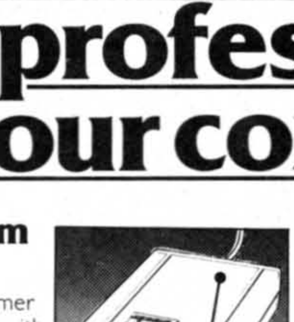
Viglen add a touch more professionalism to your computing

The Viglen Eprom Programmer

At last - an Eprom Programmer that anyone can use. Comes with very powerful and yet very easy to use software allowing effortless copying and programming of all Eprom types useable in the BBC. Also copies ROMs. Just look at all these features:



High speed programming routine programs eproms in seconds.

Zero insertion force socket - avoids damage to Eproms.

Built in power supply avoids overloading the BBC.

Ideal for both the first time and the more advanced user.

Special offer: each programmer comes with two FREE programs, that help you put your own programs onto eprom.

Price: **£79.95**
Including VAT *add £8 carriage*

Also available Eproms 8K @ £4.95 16K @ £9.95 P. & P. £1

Send for FREE Information Sheets

Specification sheets are available on the Eprom Programmer, Keypad and Keyboard Extension. Also available a free guide to programming Eproms. Please send a S.A.E. when requesting any of these information sheets.

MU6/5

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Please call for latest prices, product details and to place credit card orders. Government and Educational Establishments enquiries welcome on this number

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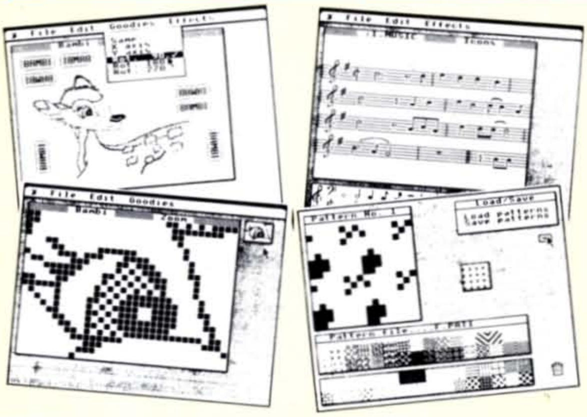
NEW! More packages to add extra programming power to the AMX mouse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Bambi
Zoom
File Edit Effects
Icons
Load/Save
Load patterns
Save patterns
Pattern No. 1
Pattern file

AMX UTILITIES

£13.45 (or £32.90 with AMX Desk)

Exploit the graphics potential of your mouse to the full with this incredible package. Among its many exciting new features is the Zoom facility which gives you amazing editing precision: each dot of your drawing becomes a full character, allowing exact control of detail. In addition AMX Utilities support copy, move, rotate, reflect, enhanced circles, ellipses – and many more powerful functions, including colour sketch.

Only available on 5¼" or 3" disc.

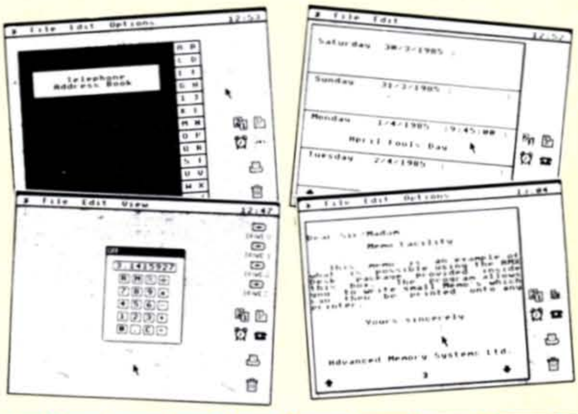
AMX DESK

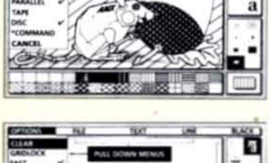
£21.95 (or £32.90 with AMX Utilities)

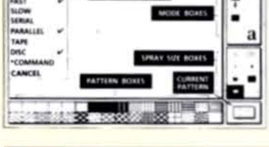
There's no excuse for being disorganised now! AMX DESK contains the complete desktop organiser: Memo Pad, Telephone Book, Diary, Alarm Clock, Calculator, Constant Time Display and Trash Can – everything you need to maximise your efficiency is available in this amazing, value for money package.

The SYSTEM, FILE and EDIT menus are simplicity itself to handle. And of course, the whole package is Icon driven: just choose the relevant picture with your mouse and away you go!

Only available on 5¼" or 3" disc.


File Edit Options
Telephone Address Book
File Edit
Saturday 30/3/1985
Sunday 31/3/1985
Monday 1/4/1985 19:45:00
April Fools Day
Tuesday 2/4/1985
File Edit View
3.1415927
File Edit Options
Dear Sir/Madam
Memo facility
Yours sincerely
Advanced Memory Systems Ltd.


OPTIONS
FILE
TEXT
LINE
BLACK
CLEAR
GRIDLOCK
FAST
SLOW
SERIAL
PARALLEL
TAPE
DISC
*COMMAND
CANCEL


OPTIONS
FILE
TEXT
LINE
BLACK
CLEAR
GRIDLOCK
FAST
SLOW
SERIAL
PARALLEL
TAPE
DISC
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CANCEL
PULL DOWN MENUS
MODE BOXES
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PATTERN BOXES
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It's no wonder the AMX mouse has been nominated for the Peripheral of the Year award.

For the first time it gives the BBC Micro advanced facilities until now only available on far more expensive machines such as the Apple Macintosh.

For beginners it's an ideal introduction to such sophisticated techniques as icons, windows, pull-down menus, spray cans and other devices for creating your own on-screen pictures. And with this special offer from *The Micro User* comes a package of software that opens up a wide range of other uses. ***This is a limited offer – so don't delay in placing your order.***

Basic package consists of:
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AMX Rom
AMX Art
Icon Designer

Purchasers will receive software on cassette and either 3in or 5¼in 40 track disc. Please state preference on order form.

ONLY
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Including VAT and P&P.

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Basic package @ £79.95	☐
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AMX Desk @ £21.95	☐
AMX Desk & Utilities @ £32.90	☐
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Give your micro the power of SPEECH!

You've heard of computer feedback, now try computer talkback with our low cost offer on the official Acorn speech extension.

- ★ 164 words and word parts from which you can construct your own new sounds with ease.
- ★ Simple to use from Basic – each word is called via its own unique reference number used with the SOUND –1 command.
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- ★ Easy-to-understand instruction manuals included.
- ★ A decent British accent – Kenneth Kendal at his best.

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NOW EVEN BIGGER

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Upgrade to Basic II for a very special price!

Big saving! ONLY £23.50

This is what you get with Basic II:

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- ● EVAL will work with PAGE, HIMEM and other pseudo-variables.
- ● The INSTRing bug has been corrected.
- ● More efficient handling of string memory.
- ● EQUB, EQUD and EQUW – invaluable in assembler.
- ● 0% combined with extra values of OPT to enable offset assembly.

Don't miss this exceptional offer

The Advanced User Guide *is the essential companion for the BBC Micro . . . with 512 information-packed pages*

Featured in its 512 pages are:
- ★ the BASIC Assembler
- ★ 6502 machine code reference section
- ★ complete descriptions of all FX calls
- ★ BBC memory usage and vectors explained
- ★ full interfacing details for the user port, tube, analogue port, 1 MHz bus
- ★ paged ROMs explained ★ and lots, lots more.

With many examples to illustrate the text, this guide is the indispensable reference work for the serious BBC Micro programmer.

£11.50

Assembly Programming Made Easy *puts the magic world of machine code at your finger-tips*

Here is a really easy guide for the enthusiastic beginner to assembly language for the BBC Micro. Using easy examples, cartoons and short, very simple programs you will quickly learn how to put graphics on the screen, use the BBC operating system and bring the machine to life.

To make learning assembly language even easier send for the combined book and tape cassette containing all the programs.

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This package contains four rip-roaring games for the Electron and BBC Micro

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SNAPMAN – Guide your man through the maze as he munches energy pellets and avoids hostile aliens.

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Electron tape £5.95
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Also on 3" disc

It's never been cheaper!

6502

SECOND PROCESSOR

At last you can afford to fully realise the tremendous potential of your BBC Micro. With the Acorn 6502 Second Processor.

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- Runs faster than ever before – its 6502 microprocessor is clocked at an incredible 3MHz.
- Gains access to the wealth of software specifically designed to take advantage of the second processor's phenominal power. Hi-View, Pascal, Bitstik and the P-System are just a few of the exciting packages available. It comes complete with Hi Basic – over 44k for your Basic programs, whatever mode you're in!

. . . at only

£184 inc VAT

You can't afford to miss out. After all, as the saying has it, two 6502s are better than one!

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– the language everyone's been waiting for

Considered by computer professionals, educationalists and hobbyists alike to be the language of choice for effective programming. Acornsoft's ISO-Pascal sets new standards in the field of microcomputer languages. And it's easy to see why. The package features:

- Complete implementation of ISO-Pascal. The BBC Micro is the only micro on which this has been achieved!
- A fully compiled language – faster and more efficient than Basic.
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- Tube compatability. It becomes even more powerful when used with the second processor.

This incredible value for money package consists of two 16k ROMs, a 5¼ in disc, comprehensive manual and a superb tutorial guide for newcomers to the language.

Free yourself from the constraints of Basic programming. ISO-Pascal is only

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Britain's first scrolling 3D arcade game for the BBC Micro is yours FREE with every new Micro User subscription or renewal.

This is the classic game that took the BBC Micro world by storm when it introduced a completely new generation of 3D graphics. And it's still a best seller!

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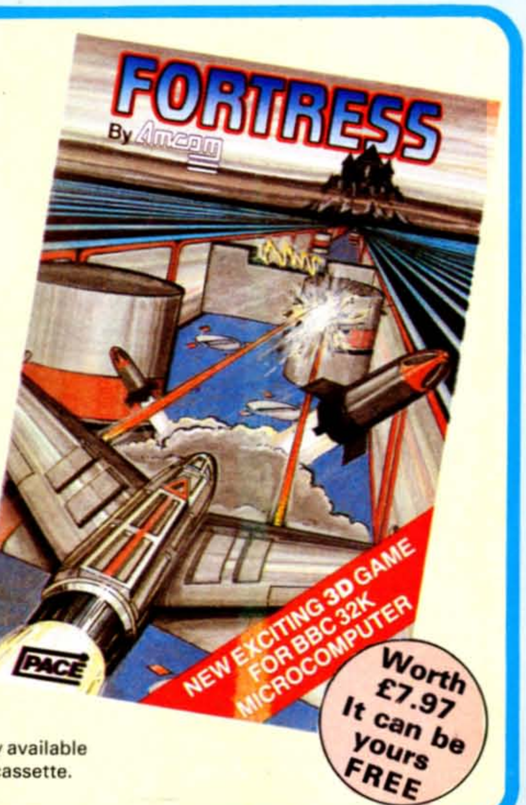
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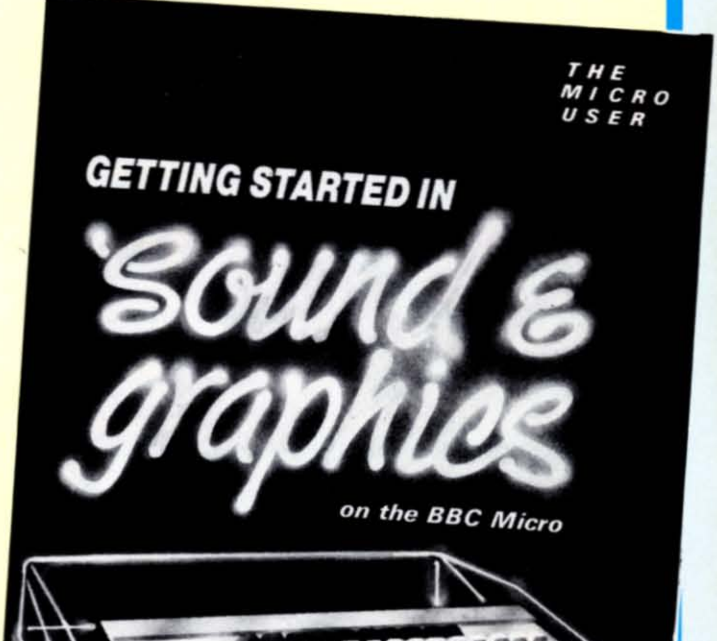

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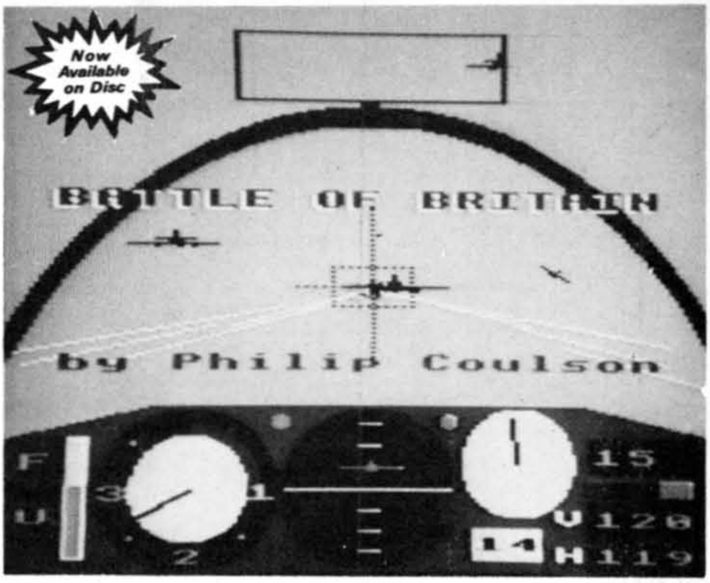

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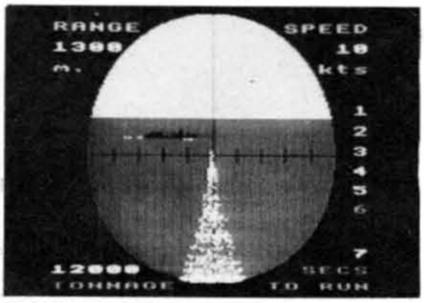

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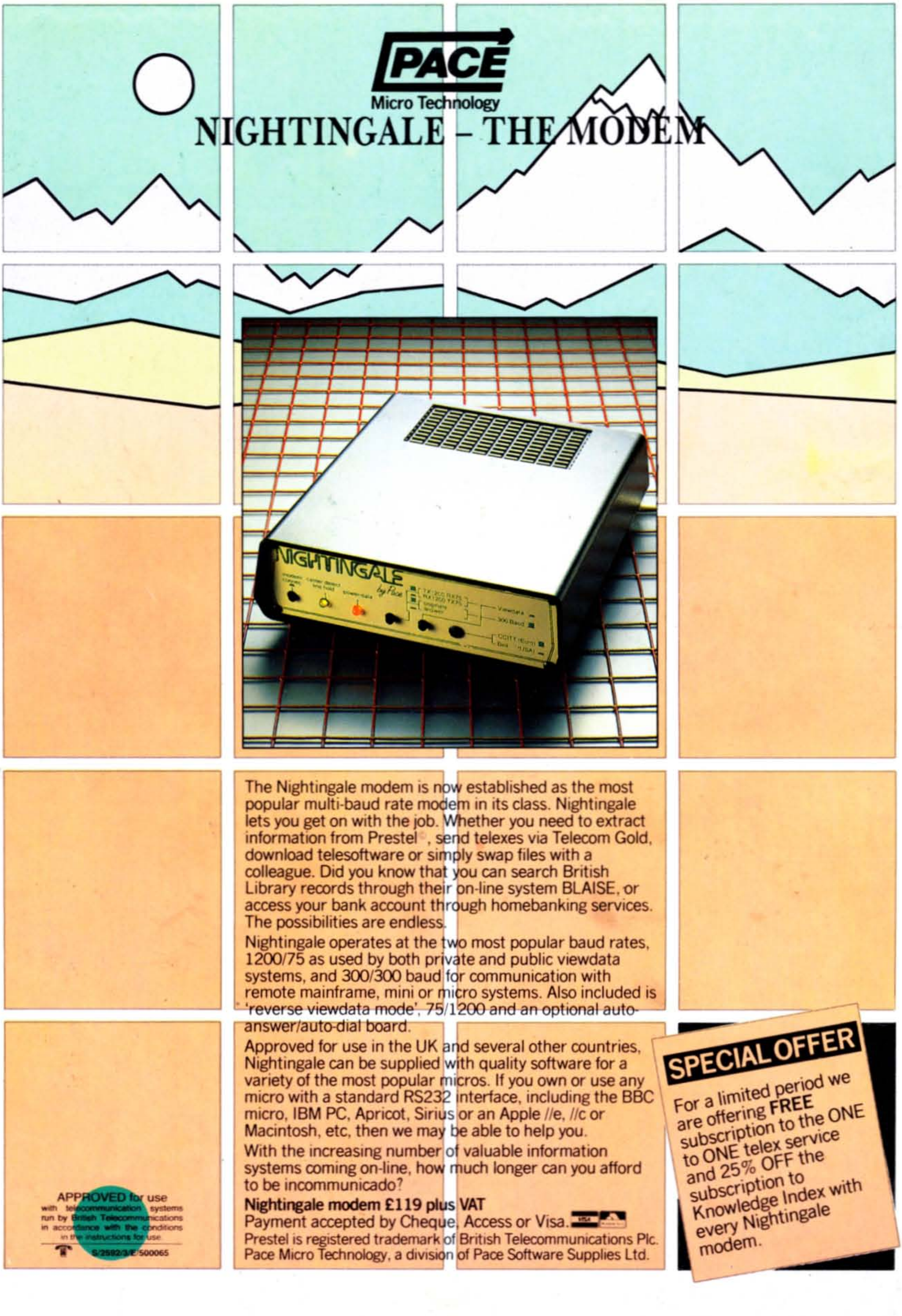

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